300 Area Waste Acid Treatment System Closure Plan

Date Published
March 1996

**United States
Department of Energy**

P.O. Box 550
Richland, Washington 99352

Approved for Public Release

MASTER

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**STATE ENVIRONMENTAL POLICY ACT (SEPA)
ENVIRONMENTAL CHECKLIST FORMS**

FOR

**WASTE ACID TREATMENT SYSTEM
RCRA CLOSURE PLAN**

300 AREA, HANFORD FACILITY

REVISION 1

March 1996

**WASHINGTON ADMINISTRATIVE CODE
ENVIRONMENTAL CHECKLIST FORM
[WAC 197-11-960]**

300 AREA WASTE ACID TREATMENT SYSTEM-SEPA CHECKLIST

A. BACKGROUND

1. Name of proposed project, if applicable:

Closure of the 300 Area Waste Acid Treatment System (WATS),
Benton County, Richland, Washington

Information contained in this checklist applies only to the
300 Area WATS. Additional environmental information regarding the
Hanford Facility can be found in the environmental documents
referenced in the answer to checklist question A.8².

2. Name of applicants:

Owner and operator: U.S. Department of Energy, Richland Operations
Office (DOE-RL). Co-operator: Westinghouse Hanford Company (WHC).

3. Address and phone number of applicants and contact persons:

Owner and Operator
U.S. Department of Energy
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

Co-operator
Westinghouse Hanford Company
P.O. Box 1970
Richland, Washington 99352

Contact:

J. E. Rasmussen, Director
Environmental Assurance, Permits
and Policy Division
(509) 376-5441

W. T. Dixon, Director
Environmental Services
(509) 376-0428

4. Date checklist prepared:

September 1995

5. Agency requesting the checklist:

State of Washington
Department of Ecology
Mail Stop PV-11
Olympia, Washington 98504-8711

6. Proposed timing or schedule (including phasing, if applicable):

Final closure activities will be completed in 3 phases and certified
in accordance with the 300 Area WATS closure plan by the Washington
State Department of Ecology (Ecology) and the U.S. Environmental
Protection Agency (EPA).

It is anticipated that the 300 Area WATS closure would take 2 years
to complete.

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7. Do you have any plans for future additions, expansions, or further activity related to or connected with this proposal? If yes, explain.

The 300 Area WATS is located within operable units 300-FF-2 (source) and 300-FF-5 (groundwater), as designated in the Hanford Federal Facility Agreement and Consent Order (Tri-Party Agreement)¹. Operable units 300-FF-2 and 300-FF-5 are scheduled to be remediated using the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Remedial Investigation/Feasibility Study (RI/FS) process. Thus, any remediation of the 300 Area WATS with respect to contaminants not produced by those facilities and soils and groundwater will be deferred to the CERCLA RI/FS process.

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.

A Resource Conservation and Recovery Act (RCRA) Part A Permit application for the 300 Area WATS was submitted for interim status in May 1988 to Ecology. It is scheduled to be incorporated into the Hanford Facility RCRA permit as a closure unit to be closed under Part V final facility standards effective in 1997. Additional environmental information regarding the Hanford Site can be found in the following documents:

Final Environmental Impact Statement - Waste Management Operations, Hanford Reservation, Richland Washington, ERDA-1538, Volume 1, U.S. Energy Research and Development Administration, 1975, Richland, Washington.

General information about the Hanford Facility environment may be found in the *Hanford Site National Environmental Policy Act (NEPA) Characterization*² document. This document is updated periodically by Pacific Northwest National Laboratory (PNNL), and provides current information about the Hanford Facility's climate and meteorology, ecology, history and archaeology, socioeconomics, land use and noise levels, and geology and hydrology. This baseline data for the Hanford Facility and its past activities are useful for evaluating proposed activities and their potential impacts. The buildings and facilities to be closed and the actions to be carried out are included in an approved categorical exclusion for "Deactivation and Stabilization of the 300 Area Fuel Supply Facilities, Hanford Site, Richland, Washington," approved by DOE-RL on August 17, 1994.

1 Ecology, EPA, and DOE, 1993, Hanford Federal Facility Agreement and Consent Order, as amended, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington.

2 Hanford Site National Environmental Policy Act (NEPA) Characterization, C.E. Cushing, ed., Rev. 7, PNL-6415, Pacific Northwest Laboratory, Richland, Washington.

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9. Do you know whether applications are pending for government approvals of other proposals directly affecting property covered by your proposal?

No other applications are pending.

10. List any government approvals or permits that will be needed for your proposal, if known.

Ecology is the lead agency authorized to approve the closure plan for the 300 Area WATS site as a RCRA TSD unit under the requirements of WAC 173-303-610, *Closure and Postclosure*. The closure plan would be incorporated into the Hanford Facility RCRA permit as a final status TSD unit. This is scheduled to be effective the summer of 1997.

Air permitting or approval of air monitoring systems from the Washington State Department of Health may be required for certain decontamination activities primarily due to radiological concerns. No other permits are known to be required at this time.

11. Give a brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page.

This project proposes a clean closure of the 300 Area WATS by removing and dispensing of tanks and ancillary equipment contaminated with dangerous waste or waste residues and by decontaminating structures and components that will remain after closure to the clean closure standard of a clean debris surface.

Closure activities would be performed on the 313, 333, 334-A, 303-F Buildings and the 311 and 334 Tank Farms located in the 300 Area of the Hanford Site. These facilities were used to treat and store waste acid that was generated in the 333 Building.

Closure activities could include sampling of the soil beneath buildings if determined during closure to be necessary.

Post closure monitoring is not required because the current plan envisions clean closure in which no regulated waste would remain after completion of closure. However, if clean closure cannot be achieved, then post-closure monitoring in accordance with a post-closure permit application would be enacted.

12. Give the location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably

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available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist.

The 300 Area WATS is located in T10N, R25E, Section 11, in the northwest portion of the 300 Area of the Hanford Facility. Maps and detailed plans are included in the closure plan.

300 AREA WASTE ACID TREATMENT SYSTEM-SEPA CHECKLIST

TO BE COMPLETED BY APPLICANT

EVALUATION FOR
AGENCY USE ONLY

B. ENVIRONMENTAL ELEMENTS

1. Earth

- a. General description of the site (circle one):
[Flat], rolling, hilly, steep slopes, mountainous,
other _____.

Flat terrain.

- b. What is the steepest slope on the site (approximate percent slope)?

The approximate slope of the land at the site is less than two percent.

- c. What general types of soils are found on the site? (for example, clay, sandy gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any prime farmland.

The soil at the site consists of compact soil and gravel material with excellent drainage characteristics. More detailed information concerning specific 300 Area soil classification can be found in the *Hanford Site National Environment Policy Act (NEPA) Characterization*³ document. Farming is not permitted on this portion of the Hanford Facility.

- d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.

No. Seismicity of the Columbia Plateau is relatively low. There are no surface indications of slumping, sliding, or instability.

- e. Describe the purpose, type, and approximate quantities of any filling or grading proposed. Indicate the source of the fill.

None at this time.

³ Cushing, ed., Hanford Site Characterization, Rev. 6

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- f. Could erosion occur as a result of clearing, construction, or use? If so, describe.

Due to the flat topography, dry climate, and soil type present at the site, only a minor amount of soil erosion is expected as a result of the proposed action.

- g. Approximately what percentage of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?

The closure plan does not recognize the potential to add any impervious surfaces beyond those existing on the site.

- h. Proposed measures to reduce or control erosion, or other impacts to the earth, if there are any?

None at this time.

2. Air

- a. What types of emissions to the air would result from the proposal (i.e., dust, automobile, odors, industrial wood smoke) during construction and when the project is completed? If any, generally describe and give approximate quantities, if known.

Vehicles and machinery used in these activities would produce minor amounts of air emissions in the form of exhaust gases. Minor amounts of dust may be generated from activities associated with the closure and abated with water sprinkling, as required.

A potential exists for emissions to the air of radionuclides and toxic air pollutants from 300 Area WATS decontamination of tank system components and concrete secondary containment.

- b. Are there any off-site sources of emissions or odors that may affect your proposal? If so, generally describe.

Offsite emissions and odors are not expected to as a result of the proposed action.

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- c. Proposed measures to reduce or control emissions or other impacts to the air, if any?

Environmental protections could include air monitoring and/or air filtration measures to be taken during closure activities as stipulated in air permits/approvals discussed in A.10.

To keep exposures as low as reasonably achievable (ALARA), workers within the 300 Area WATS unit would wear proper protective clothing and use proper respiratory equipment (which may include masks and bottled "fresh" air), where appropriate, to prevent skin exposures and/or inhalation of possible toxic air emissions.

3. Water

a. Surface

- 1) Is there any surface water body in or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.

Yes. The closest body of surface-water is the Columbia River, which is approximately 536 meters (1,760 feet) from the 300 Area WATS.

- 2) Will the project require any work over, in, or adjacent to (within 200 feet of) the described waters? If yes, please describe and attach available plans.

No.

- 3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of the fill.

None required.

- 4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known.

No.

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- 5) Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.

No.

- 6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.

No discharge of waste materials to surface waters would occur.

b. Ground

- 1) Will ground water be withdrawn, or will water be discharged to ground water? Give general description, purpose, and approximate quantities if known.

No ground water would be withdrawn in support of this proposal, and water would not be discharged to the aquifer.

- 2) Describe waste materials that will be discharged into the ground from septic waste tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals...; agricultural; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.

Does not apply.

c. Water Run-off (including storm water)

- 1) Describe the source of run-off (including storm water) and methods of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other wastes? If so, describe.

The Hanford Facility has an arid climate, which averages less than 8 inches of annual precipitation. Most of the runoff is the result of rain or snowmelt. This small amount of

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natural precipitation poses little threat of erosion to the unit and is readily absorbed into the soil on and near the site. There are currently no plans for collecting or disposing of waste water.

Most of this precipitation is returned to the atmosphere through evapotranspiration⁴. Precipitation which is not returned to the atmosphere through evapotranspiration and infiltrates into the soil could cause contaminants to leach deeper into the underlying soil.

- 2) Could waste materials enter ground or surface waters? If so, generally describe.

No. Closure activities generally will occur inside buildings and over tank system containment surfaces. Therefore, runoff of decontamination solutions or contaminated rainwater to soils will not occur.

- d. Proposed measures to reduce or control surface, ground, and runoff water impacts, if any:

Although contaminated runoff waste could infiltrate into the soil, there are no expected impacts to ground water as a result of this proposal.

During the closure process, any potential impacts as a result of contamination to surface, ground, and runoff water will be mitigated.

4

Evapotranspiration: Discharge of water from the earth's surface to the atmosphere by evaporation from lakes, streams, and soil surfaces and by transpiration from plants; total evaporation or water loss.

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4. Plants

- a. Check or circle the types of vegetation found on the site.

☐ deciduous tree: alder, maple, aspen, other
☐ evergreen tree: fir, cedar, pine, other
☐ shrubs
☐ grass
☐ pasture
☐ crop or grain
☐ wet soil plants: cattail, buttercup, bulrush, skunk cabbage, other
☐ water plants: water lily, eelgrass, milfoil, other
☐ other types of vegetation

There is no vegetation at the site.

- b. What kind and amount of vegetation will be removed or altered?

None.

- c. List threatened or endangered species known to be on or near the site.

None. Additional information on the Hanford Site environment can be found in the environmental documents referred to in the answer to checklist A.8.

- d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site. if any:

None.

5. Animals

- a. Circle any birds and animals which have been observed on or near the site or are known to be on or near the site:

birds: hawk, heron, eagle, songbirds, other: None
mammals: deer, bear, elk, beaver, other: None
fish: bass, salmon, trout, herring, shellfish: None

The 300 Area is a highly industrialized, heavily disturbed area of the Hanford Facility. Some

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birds, and small mammals common to the Hanford Facility have been observed in the vicinity of the 300 Area WATS. Birds and mammals which have been observed near the 300 Area WATS include pigeons, lagomorphs, and coyotes.

Additional information on birds and animals can be found in the environmental documents referenced in the answer to checklist question A.8.

- b. List any threatened or endangered species known to be on or near the site.

The Bald Eagle and White Pelican are sometimes seen on the Hartford Site, and may possibly be seen near the 300 Area WATS. The 300 Area WATS site isn't known to be used by any threatened or endangered species. Additional information on birds and animals can be found in the environmental documents referenced in the answer to checklist question A.8.

- c. Is the site part of a migration route? If so, explain.

Yes. The Hanford Site is part of a migration route for some birds. The region bounding the Columbia River (opposite the Hanford Site) is used as a resting place for Pacific flyway waterfowl and shore birds during the autumn migration. Additional information on birds and animals found on the Hanford Site can be found in the environmental documents referenced in the answer to checklist question A.8.

- d. Proposed measures to preserve or enhance wildlife, if any:

None.

6. Energy and Natural Resources

- a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.

Fuel would be consumed by motor vehicles which are used to gain access to the site. Electrically powered machines would consume electricity.

- b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.

No.

- c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any:

None.

7. Environmental Health

- a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste that could occur as a result of this proposal? If so, describe.

Environmental health hazards are not expected. However, there is a potential for accidental exposure to hazardous or radioactive materials during the decontamination effort. Procedures to prevent and manage hazards are presented in the closure plan.

- 1) Describe special emergency services that might be required.

Hanford Facility security, fire response, and ambulance services are on call at all times in the event of an onsite emergency.

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2) Proposed measures to reduce or control environmental health hazards, if any:

Environmental health hazards are expected to be minimal. Procedures to prevent and manage potential hazards are presented in the closure plan.

b. Noise

1) What type of noise exists in the area which may affect your project (for example: traffic, equipment, operation,

None.

2) What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, etc.)? Indicate what hours noise would come from the site.

A small short-term increase in noise may occur as a result of traffic and equipment used to support the closure activities.

3) Proposed measures to reduce or control noise impacts, if any:

None.

8. Land and Shoreline Use

a. What is the current use of the site and adjacent properties?

The 300 Area WATS is part of the Hanford Facility, which contains many facilities for waste management and special nuclear materials production. The facility provided treatment and storage of waste acid which was produced by the 333 Facility. The facility was operational from the early 1960's through 1986 when routine operations ceased.

b. Has the site been used for agriculture? If so, describe.

No portion of the Hanford Site, including the 300 Area WATS, has been used for agricultural purposes since 1943.

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c. Describe any structures on the site.

The 300 Area WATS includes portions of the 311 and 334 Tank Farms, and the 333, 313, 334-A, and 303-F Buildings. Activities in support of final closure would be performed in these facilities.

The 334-A 38-ft-by-18-ft metal building contains three dangerous waste storage tanks (Tanks A, B, and C) that will remain after closure. The 333 and 313 Buildings are large metal buildings having only small RCRA areas addressed by this closure proposal. The 303-F Building is a 14.02-m-by-7.62-m (46-ft-by-25-ft) concrete block building, only a small portion of which is a RCRA area being closed under this proposal. The RCRA area of 311 Tank Farm contains two large aboveground tanks set above separate concrete catch basins. All that remains of the 334 Tank Farm is a concrete pad below now-removed Tank 4 and the tank support structure.

d. Will any structures be demolished? If so, what?

No. Demolition of structures will not occur until after closure.

e. What is the current zoning classification of the site?

The entire Hanford Site is zoned by Benton County as an Unclassified Use (U) district.

f. What is the current comprehensive plan designation of the site?

The 1985 Benton County Comprehensive Land Use Plan designates the Hanford Site as the "Hanford Reservation." Under this designation, land on the Site may be used for "activities nuclear in nature." Non-nuclear activities are authorized "if and when DOE approval for such activities is obtained."

g. If applicable, what is the current master shoreline program designation of the site?

Does not apply.

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- h. Has any part of the site been classified as an 'environmentally sensitive' area? If so, specify.

No.

- i. Approximately how many people would reside or work in the completed project?

None.

- j. Approximately how many people would the completed project displace?

None.

- k. Proposed measures to avoid or reduce displacement impacts, if any:

None.

- l. Proposed measures to ensure the proposal is compatible with existing and projected land use and plans, if any:

Does not apply. (See answer to checklist question B.8.f.)

9. Housing

- a. Approximately how many units would be provided, if any? Indicate whether high-, middle-, or low-income housing.

None.

- b. Approximately how many units, if any, would be eliminated? Indicate whether high-, middle-, or low-income housing.

None.

- c. Proposed measures to reduce or control housing impacts, if any:

Does not apply.

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10. Aesthetics

- a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?

None.

- b. What views in the immediate vicinity would be altered or obstructed?

None.

- c. Proposed measures to reduce or control aesthetic impacts, if any:

None.

11. Light and Glare

- a. What type of light or glare will the proposal produce? What time of day would it mainly occur?

None.

- b. Could light or glare from the finished project be a safety hazard or interfere with views?

No.

- c. What existing off-site sources of light or glare may affect your proposal?

None.

- d. Proposed measures to reduce or control light and glare impacts, if any:

None.

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12. Recreation

- a. What designated and informal recreational opportunities are in the immediate vicinity?

None.

- b. Would the proposed project displace any existing recreational uses? If so, describe.

Does not apply.

- c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any?

Does not apply.

13. Historic and Cultural Preservation

- a. Are there any places or objects listed on, or proposed for, national, state, or local preservation registers known to be on or next to the site? If so., generally describe.

Portions of the 300 Area WATS contribute structures to a proposed Hanford Historical District.

- b. Generally describe any landmarks or evidence of historic, archaeological, scientific, or cultural importance known to be on or next to the site.

See 13.c.

- c. Proposed measures to reduce or control impacts, if any:

The DOE-RL is currently in the process of submitting a letter to the Washington State Historical Preservation Officer regarding RCRA closure of portions of the 300 Area WATS that contribute to a proposed Hanford District. The letter identifies a good faith effort on the part of DOE-RL to identify and preserve historical properties of these facilities and requests concurrence to proceed with RCRA closure of the WATS facilities.

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14. Transportation

- a. Identify public streets and highways serving the site, and describe proposed access to the existing street system. Show on site plans, if any.

Does not apply.

- b. Is site currently served by public transit? If not, what is the approximate distance to the nearest transit stop?

The site is not publicly accessible and therefore, is not served by public transit.

- c. How many parking spaces would the completed project have? How many would the project eliminate?

None.

- d. Will the proposal require any new roads or streets, or improvements to existing roads or streets, not including driveways? If so, generally describe (indicate whether public or private).

No.

- e. Will the project use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.

No.

- f. How many vehicular trips per day would be generated by the completed project? If known, indicate when peak volumes would occur.

None.

- g. Proposed measures to reduce or control transportation impacts, if any:

Does not apply.

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15. Public Services

- a. Would the project result in an increased need for public services (for example: fire protection, police protection, health care, schools, other)? If so, generally describe.

No.

- b. Proposed measures to reduce or control direct impacts on public services, if any:

Does not apply.

16. Utilities

- a. List utilities currently available at the site: electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other:

Electricity, phone, sanitary, and water.

- b. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed.

None.

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C. SIGNATURES

The above answers are true and complete to the best of my knowledge.
We understand that the lead agency is relying on them to make its decision.

James E. Rasmussen, Director
Environmental Assurance, Permits,
and Policy Division
(509) 376-5441

4/9/96

Date

J. M. Steffen, Manager
Fuel Fab Facilities Transition
Project
(509) 376-0484

4/9/96

Date

300 AREA WASTE ACID TREATMENT
SYSTEM CLOSURE PLAN

The Hanford Facility is owned by the U.S. Government and operated by the U.S. Department of Energy, Richland Operations Office. Dangerous waste and mixed waste (containing both radioactive and dangerous components) are produced and managed on the Hanford Facility. The dangerous waste is regulated in accordance with the *Resource Conservation and Recovery Act of 1976* and the *State of Washington Hazardous Waste Management Act of 1976* (as administered through the Washington State Department of Ecology *Dangerous Waste Regulations, Washington Administrative Code 173-303*). The radioactive component of mixed waste is interpreted by the U.S. Department of Energy to be regulated under the *Atomic Energy Act of 1954*; the nonradioactive dangerous component of mixed waste is interpreted to be regulated under the *Resource Conservation and Recovery Act of 1976* and *Washington Administrative Code 173-303*.

For the purposes of the *Resource Conservation and Recovery Act*, the Hanford Facility is considered to be a single facility. The single dangerous waste permit identification number issued to the Hanford Facility by the U.S. Environmental Protection Agency and the Washington State Department of Ecology is Environmental Protection Agency/State Identification Number WA890008967. This identification number encompasses a number of treatment, storage, and/or disposal units within the Hanford Facility. Treatment, storage, and/or disposal units that are no longer operating will be closed under interim status (using final status standards in *Washington Administrative Code 173-303-610*).

Since 1987, Westinghouse Hanford Company has been a major contractor to the U.S. Department of Energy, Richland Operations Office and has served as co-operator of the 300 Area Waste Acid Treatment System, the waste management unit addressed in this closure plan. For the purposes of the *Resource Conservation and Recovery Act*, Westinghouse Hanford Company is identified as 'co-operator.' Any identification of Westinghouse Hanford as an operator elsewhere in this closure plan is not meant to conflict with Westinghouse Hanford Company's designation as co-operator, but rather is based on Westinghouse Hanford Company's contractual status (i.e., as a management and operations contractor) for the U.S. Department of Energy.

The *300 Area Waste Acid Treatment System Closure Plan (Revision 1)* consists of a *Resource Conservation and Recovery Act Part A Dangerous Waste Permit Application, Form 3* and a *Resource Conservation and Recovery Act Closure Plan*. An explanation of the Part A Permit Application, Form 3 submitted with this document is provided at the beginning of the Part A Section. The closure plan consists of nine chapters and six appendices.

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TREATMENT SYSTEM PRIOR TO 1980

APPENDIX 4B SUMMARY OF NONROUTINE WASTES TREATED IN THE 300 AREA
WASTE ACID TREATMENT SYSTEM PRIOR TO 1980

APPENDIX 7A QUALITY ASSURANCE PROJECT PLAN FOR SAMPLING
AND ANALYSIS FOR THE 300 AREA WASTE ACID
TREATMENT SYSTEM

APPENDIX 7B TRAINING MATRIX

APPENDIX 7C TANK 2 SAMPLING RESULTS

LIST OF TERMS

1		
2		
3		
4	ALARA	as low as reasonably achievable
5		
6	CERCLA	<i>Comprehensive Environmental Response, Compensation, and</i>
7		<i>Liability Act of 1980</i>
8	CFR	Code of Federal Regulations
9	CV	coefficient of variation
10	CWDP	Chemical Waste Disposal Permits
11		
12	DISAP	Decontamination, Inspection, and Sampling and Analysis Plan
13	DOE	U.S. Department of Energy
14	DOE-RL	DOE, Richland Operations Office
15	DQO	data quality objective
16	DST	double-shell tank
17		
18	Ecology	Washington State Department of Ecology
19	EII	Environmental Investigations Instruction
20	EPA	U.S. Environmental Protection Agency
21		
22	HASP	health and safety plan
23	HL	health-based level
24	HEPA	high efficiency particulate filtration
25	HSRCM-1	Hanford Site Radiological Control Manual
26		
27	IRIS	Integrated Risk Information System
28		
29	LLRW	low-level radioactive waste
30	LLRMW	low-level radioactive mixed waste
31	LOQ	limit of quantitation
32		
33	MDL	method detection limit
34	M&O	Management and Operations
35	MTCA	<i>Model Toxics Control Act</i>
36		
37	OU	Operable Units
38		
39	P	percent recovery
40	PE	professional engineer
41	PS	Process Sewer
42	PVC	polyvinyl chloride
43		
44	QA	quality assurance
45	QA/QC	quality assurance/quality control
46	QAPJP	Quality Assurance Project Plan
47	QC	quality control
48	QI	Quality Instructions
49	QR	Quality Requirement

1	R	range
2	RCRA	<i>Resource Conservation and Recovery Act of 1976</i>
3	RI/FS	remedial investigation/feasibility study
4	ROD	record of decision
5	RPD	relative percent difference
6	RR	relative range
7	RSD	relative standard deviation
8		
9	SAP	sampling and analysis plan
10		
11	Tri-Party	
12	Agreement	<i>Hanford Federal Facility Agreement and Consent Order</i>
13	TSD	treatment, storage, and/or disposal
14		
15	WAC	<i>Washington Administrative Code</i>
16	WATS	Waste Acid Treatment System
17	WHC	Westinghouse Hanford Company
18	WRRRC	Waste and Residue Removal Checklist

PART A

The Hanford Facility Dangerous Waste Part A Permit Application, Form 3, Revision 4, for the 300 Area Waste Acid Treatment System (TSD: TS-3-1) was submitted to the Washington State Department of Ecology March 1996 for review and approval. A copy of the Part A, Form 3 (Revision 4) is provided herein.

Revision 4 removes dangerous waste numbers U123 (formic acid), P120 (vanadium pentoxide), and D011 (silver) as having been inappropriately added to Revision 0 of the 300 Area Waste Acid Treatment System Part A. These wastes were never actually managed at the 300 Area Waste Acid Treatment System during its operations as a *Resource Conservation and Recovery Act of 1976* treatment, storage, and/or disposal unit. Revision 4 also adds a brief discussion in Section III(C) of storage Tanks 5 and 11 located in the 313 Building and a photograph of Tank 5.

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

FORM 3		DANGEROUS WASTE PERMIT APPLICATION		1. EPA/STATE I.D. NUMBER WA7890008967	
FOR OFFICIAL USE ONLY					
APPLICATION APPROVED		DATE RECEIVED (mo., day, & yr.)		COMMENTS	
II. FIRST OR REVISED APPLICATION					
Place an "X" in the appropriate box in A or B below (mark one box only) to indicate whether this is the first application you are submitting for your facility or a revised application. If this is your first application and you already know your facility's EPA/STATE I.D. Number, or if this is a revised application, enter your facility's EPA/STATE I.D. Number in Section I above.					
A. FIRST APPLICATION (place an "X" below and provide the appropriate date)					
☐ 1. EXISTING FACILITY (See instructions for definition of "existing" facility. Complete item below.)		☐ 2. NEW FACILITY (Complete item below)			
* MO. DAY YR. 04 73		MO. DAY YR. FOR NEW FACILITIES, PROVIDE THE DATE, (mo., day, & yr.) OPERATION BEGAN OR IS EXPECTED TO BEGIN			
B. REVISED APPLICATION (place an "X" below and complete Section I above)					
☒ 1. FACILITY HAS AN INTERIM STATUS PERMIT		☐ 2. FACILITY HAS A FINAL PERMIT			
III. PROCESSES - CODES AND CAPACITIES					
A. PROCESS CODE - Enter the code from the list of process codes below that best describes each process to be used at the facility. Ten lines are provided for entering codes. If more lines are needed, enter the code(s) in the space provided. If a process will be used that is not included in the list of codes below, then describe the process (including its design capacity) in the space provided on the (Section III-C).					
B. PROCESS DESIGN CAPACITY - For each code entered in column A enter the capacity of the process.					
1. AMOUNT - Enter the amount.					
2. UNIT OF MEASURE - For each amount entered in column B(1), enter the code from the list of unit measure codes below that describes the unit of measure used. Only the units of measure that are listed below should be used.					
PROCESS		PRO- CESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY	PROCESS	PRO- CESS CODE
Storage:				Treatment:	
CONTAINER (barrel, drum, etc)	S01	GALLONS OR LITERS		TANK	T01
TANK	S02	GALLONS OR LITERS			
WASTE PILE	S03	CUBIC YARDS OR CUBIC METERS		SURFACE IMPOUNDMENT	T02
SURFACE IMPOUNDMENT	S04	GALLONS OR LITERS			
Disposal:				INCINERATOR	T03
INJECTION WELL	D80	GALLONS OR LITERS			
LANDFILL	D81	ACRE-Feet (the volume that would cover one acre to a depth of one foot) OR HECTARE-METER		OTHER (Use for physical, chemical, thermal or biological treatment processes not occurring in tanks, surface impoundments or inciner- ators. Describe the processes in the space provided; Section III-C.)	T04
LAND APPLICATION	D82	ACRES OR HECTARES			
OCEAN DISPOSAL	D83	GALLONS PER DAY OR LITERS PER DAY			
SURFACE IMPOUNDMENT	D84	GALLONS OR LITERS			
UNIT OF MEASURE	UNIT OF MEASURE CODE	UNIT OF MEASURE	UNIT OF MEASURE CODE	UNIT OF MEASURE	UNIT OF MEASURE CODE
GALLONS	G	LITERS PER DAY	V	ACRE-Feet	A
LITERS	L	TONS PER HOUR	D	HECTARE-METER	F
CUBIC YARDS	Y	METRIC TONS PER HOUR	W	ACRES	B
CUBIC METERS	C	GALLONS PER HOUR	E	HECTARES	Q
GALLONS PER DAY	U	LITERS PER HOUR	H		
EXAMPLE FOR COMPLETING SECTION III (shown in line numbers X-1 and X-2 below): A facility has two storage tanks, one tank can hold 200 gallons and the other can hold 400 gallons. The facility also has an incinerator that can burn up to 20 gallons per hour.					
B. PROCESS DESIGN CAPACITY					
1. AMOUNT (specify)		2. UNIT OF MEASURE (enter code)		FOR OFFICIAL USE ONLY	
X-1		X-2		X-3	
300 Area WATS and Tank 40 began operations 04-73; Tank 50, auxiliary equipment and centrifuge began operations 11-85.					
300 Area Waste Acid Treatment System		311 Tanks			
T 0 1 14,006 V		1 T 0 1 18,927 L			
S 0 2 16,504 L		2 S 0 2 34,069 L			
T 0 4 15,899 V					

Continued from the front.

III. PROCESSES (continued)

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

REFER TO ATTACHMENT

IV. DESCRIPTION OF DANGEROUS WASTES

- A. DANGEROUS WASTE NUMBER - Enter the four digit number from Chapter 173-303 WAC for each listed dangerous waste you will handle. If you handle dangerous wastes which are not listed in Chapter 173-303 WAC, enter the four digit number(s) that describes the characteristics and/or the toxic contaminants of those dangerous wastes.
- B. ESTIMATED ANNUAL QUANTITY - For each listed waste entered in column A estimate the quantity of that waste that will be handled on an annual basis. For each characteristic or toxic contaminant entered in column A estimate the total annual quantity of all the non-listed waste(s) that will be handled which possess that characteristic or contaminant.
- C. UNIT OF MEASURE - For each quantity entered in column B enter the unit of measure code. Units of measure which must be used and the appropriate codes are:

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

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

D. PROCESSES

1. PROCESS CODES:

For listed dangerous waste: For each listed dangerous waste entered in column A select the code(s) from the list of process codes contained in Section III to indicate how the waste will be stored, treated, and/or disposed of at the facility.

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

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

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

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

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

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

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

Section III.C - Processes

T01, S02, T04 - The 300 Area Waste Acid Treatment System was used for the treatment and storage of mixed waste generated during fuel fabrication operations in the 300 Area of the Hanford Facility. The system also was used for disposing of used and/or unneeded chemicals for all Hanford Facility contractors. A portion of the waste initially was treated in two tanks (tanks 7 and 11) in the 333 Building to reduce the chromium (VI) to chromium (III) from May 1983 to January 1987. Tanks 7 and 11 were used twice a year to treat up to 757 liters (200 gallons) per day of waste (T01). This waste, along with all other waste acid generated in the 333 Building, was drained to the 334-A Building and stored in two storage tanks (tanks B and C) (S02) with a combined volume of 15,142 liters (4,000 gallons). Previously, waste entered the 334-A Building passing through a settling tank [tank A, volume 1,363 liters (360 gallons)] before entering tanks B and C. Tank A ceased receiving waste in August 1984 when piping was disconnected to the tank and waste was routed directly to Tanks B and C. Tank A was cleaned out and the polyvinyl chloride liner removed in 1988.

From startup in April 1973 until August 1973, the waste acids from the 333 Building were collected in a plastic-lined steel underground 14,385 liter (3,800 gallon) tank and a plastic-lined steel aboveground 22,712 liter (6,000 gallon) tank (tank 4) in the 334 Tank Farm. At that time, the underground tank developed a leak and was removed from service. The 334-A Building storage tanks replaced this underground tank in December 1974. Tank 4 was retained for emergency storage when the 313 Building neutralization activities were down for maintenance or revisions. Tank 4 usually was empty and, when the tank was filled in January 1986, developed a leak near the top of the tank. Tank 4 was emptied and abandoned at that time. Tank 4 was removed, cleaned, and disposed of onsite in 1988.

The waste acid was pumped from the 334-A Building to the 313 Building where the waste acid underwent pH adjustment in a waste acid neutralization tank (tank 2) (T01). Tank 2 was capable of treating a maximum of 13,249 liters (3,500 gallons) per day of waste acid. The waste acid was pumped from tank 2 to tank 11 and then to a centrifuge where the waste acid underwent further treatment to separate the liquid and solid phases of the waste acid (T04). A maximum of 11,356 liters (3,000 gallons) of waste acid per day could be treated in the centrifuge. The solid waste from the centrifuge was collected in containers and transferred to the 303-K Storage Unit. The liquid effluent was pumped from the centrifuge to tank 5 and then to a filter press for additional treatment to remove fine solids (T04), which remained following treatment in the centrifuge. The filter press treated a maximum of 4,542 liters (1,200 gallons) per day. Solids collected in the filter press were sent to the uranium recovery system or to the 303-K Storage Unit. The filtered liquid effluent was drained into effluent collection tanks (tanks 9 and 10) where the liquid effluent was stored temporarily before being pumped to the 311 Tank Farm.

Section III.C - Processes (continued)

T01,S02 - The 311 Tank Farm was used for storage of treated liquid effluents from both the 300 Area Waste Acid Treatment System and the uranium recovery process. Storage occurred in two tanks (tanks 40 and 50) with capacities of 15,142 and 18,927 liters (4,000 and 5,000 gallons), respectively. Tanks 40 and 50 are constructed of stainless steel. Tank 50, the 18,927 liter (5,000 gallon) tank, occasionally was used for decanting waste when the centrifuge in the 313 Building was down for maintenance. Tank 50 was capable of treating up to 18,927 liters (5,000 gallons) per day, but was used for decanting infrequently (total of five times between January 1986 and December 1987).

Auxiliary equipment (two pumps, two cartridge filters, and two sample ports) are housed in the adjacent 303-F Building. Auxiliary equipment was used to filter solutions and to recirculate the solutions between tanks and the 313 Building for reprocessing.

Continued from page 2.

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

D. NUMBER (entered from page 1)

W A 7 0 9 0 0 0 8 9 0 7

IV. DESCRIPTION OF DANGEROUS WASTES (continued)

LINE	A. DANGEROUS WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES				
				1. PROCESS CODES (enter)			2. PROCESS DESCRIPTION (If a code is not entered in D(1))	
1	300 Area Waste Acid Treatment System							
2	D 0 0 1	2.086.525	K	T01	S02	T04	pH Adjustments/Storage/	
3	D 0 0 2						Phase Separation	
4	W T 0 2							
5	D 0 0 4							
6	through							
7	D 0 0 9						Included With Above	
8	D 0 0 7	907	K	T01			Chemical Treatment	
9	311 Tanks							
10	W T 0 2	2.086.525	K	T01	S02		Decanting/Storage	
11	D 0 0 2							
12	D 0 0 4							
13	through							
14	D 0 0 9						Included With Above	
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								

Continued from the front.

IV. DESCRIPTION OF DANGEROUS WASTES (continued)

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

The 300 Area Waste Acid Treatment System was used to treat both mixed and dangerous waste from fuels fabrication operations in the 333 Building and from nonroutine waste additions. Treatment was performed to make the waste more amenable for further treatment and for storage. The 333 Building waste primarily consisted of hydrofluoric acid, nitric acid, sulfuric acid, and copper nitrate. These routine waste types exhibited the dangerous waste characteristics of corrosivity (D002) and ignitability (D001) as the nitric acid is considered an oxidizer in accordance with 49 Code of Federal Regulations, Part 173.127(a) and Washington Administrative Code 173-303-090(5)(a)(iv). Routine waste also was considered state-only toxic (WT02). Additionally, some of the routine waste was designated extraction procedure toxic waste due to chromium (D007). Nonroutine waste added to the system included extraction procedure toxic waste due to arsenic (D004), barium (D005), cadmium (D006), lead (D008), and mercury (D009). Approximately 2,086,525 kilograms (4,600,000 pounds) of waste were treated and stored in this system yearly. Approximately 907 kilograms (2,000 pounds) of waste (D007, chromium IV to chromium III) were treated per year.

The 311 tanks were used for the treatment and storage of waste. This waste was effluent from the waste acid treatment and uranium recovery process. This waste, depending on the variations in the treatment process, was considered mixed waste due to toxicity (WT02). Routine and nonroutine waste added to the waste acid treatment system included extraction procedure toxic waste due to arsenic (D004), barium (D005), cadmium (D006), chromium (D007), lead (D008), and mercury (D009). The waste frequently had a pH greater than 12.5, which exhibits the dangerous waste characteristic of corrosivity (D002). Approximately 2,086,525 kilograms (4,600,000 pounds) of waste were treated and stored in the 311 tanks per year.

V. FACILITY DRAWING Refer to attached drawing.

All existing facilities must include in the space provided on page 6 a scale drawing of the facility (see instructions for more details).

VI. PHOTOGRAPHS Refer to attached photographs.

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

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

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

VIII. FACILITY OWNER

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

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

1. NAME OF FACILITY'S LEGAL OWNER												2. PHONE NO. (area code & no.)			
3. STREET OR P.O. BOX						4. CITY OR TOWN						5. ST.	6. ZIP CODE		

IX. OWNER CERTIFICATION

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

NAME (print or type)	SIGNATURE	DATE SIGNED
John D. Wagoner, Manager U.S. Department of Energy Richland Operations Office		3/13/96

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

NAME (print or type)	SIGNATURE	DATE SIGNED
SEE ATTACHMENT		

X. OPERATOR CERTIFICATION

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

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

3/13/96
Date

Co-operator
R. J. Bliss, Vice President and Manager
Transition Projects
Westinghouse Hanford Company

2/22/96
Date

300 Area Waste Acid Treatment System

H9509015.1

300 AREA WASTE ACID TREATMENT SYSTEM--333 BUILDING

TANKS 7 AND 11--CHROMIUM (IV) REDUCTION

46°22'18"
119°16'35"

95080690-2CN
(PHOTO TANK 1987)

300 AREA WASTE ACID TREATMENT SYSTEM--334-A BUILDING

46°22'18"
119°16'33"

95080690-12CN
(PHOTO TANK 1995)

300 AREA WASTE ACID TREATMENT SYSTEM--334-A WASTE ACID STORAGE TANKS

TANKS A, B, AND C
(TANK A OUT OF SERVICE 1988)

46°22'18"
119°16'33"

95080690-22CN
(PHOTO TANK 1995)

300 AREA WASTE ACID TREATMENT SYSTEM--334 TANK FARM

WASTE ACID TANK 4 (REMOVED, CLEANED, AND BURIED 1988)

46°22'18"
119°16'35"

8306387-6CN
(PHOTO TANK 1983)

300 AREA WASTE ACID TREATMENT SYSTEM--313 BUILDING WASTE ACID NEUTRALIZATION TANK

TANK 2

46°22'14"
119°16'40"

8704479-6CN
(PHOTO TAKEN 1987)

300 AREA WASTE ACID TREATMENT SYSTEM-- 313 BUILDING

TANK 5

46°22'14"
119°16'40"

95080690-26CN
(PHOTO TAKEN 1987)

300 AREA WASTE ACID TREATMENT SYSTEM--313 BUILDING

FILTER PRESS

46°22'14"
119°16'40"

7510170-19CN
(PHOTO TANK 1975)

300 AREA WASTE ACID TREATMENT SYSTEM--313 BUILDING

CENTRIFUGE WITH LIQUID RECEIVING TANK 11

46°22'14"
119°16'40"

90022759- 5CN
(PHOTO TANK 1989)

300 AREA WASTE ACID TREATMENT SYSTEM--313 BUILDING

TANKS 9 AND 10--EFFLUENT COLLECTION TANKS

46°22'14"
119°16'40"

9022759-7CN
(PHOTO TANK 1990)

300 AREA WASTE ACID TREATMENT SYSTEM--311 TANK FARM

TANKS 40 AND 50

46°12'14"
119°16'38"

85050353-9CN
(PHOTO TANK 1985)

300 AREA WASTE ACID TREATMENT SYSTEM--303-F BUILDING

46°22'14"
119°16'38"

89050353-8CN
(PHOTO TANK 1989)

300 AREA WASTE ACID TREATMENT SYSTEM--303-F BUILDING

AUXILIARY EQUIPMENT (PUMPS, FILTERS, AND SAMPLE PORTS)

46°22'14"
119°16'38"

89050353-7CN
(PHOTO TANK 1989)

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300 AREA WASTE ACID TREATMENT SYSTEM CLOSURE PLAN

1.0 INTRODUCTION

This section provides a description of the Hanford Site, identifies the proposed method of 300 Area Waste Acid Treatment System (WATS) closure, and briefly summarizes the contents of each chapter of this plan.

1.1 BACKGROUND

The Hanford Site, located northwest of Richland, Washington, houses reactors, chemical separation systems, and related facilities used for the production of special nuclear materials. Activities are centralized in numerically designated areas on the Hanford Site. The 300 Area of the Hanford Site is one such area and is located approximately 3.8 kilometers (3 miles) north of Richland. The 300 Area contains several research and development laboratories and facilities that in the past were used for reactor fuel fabrication.

The 300 Area WATS is a *Resource Conservation and Recovery Act of 1976* (RCRA) treatment, storage, and/or disposal (TSD) unit that entered RCRA operations on November 19, 1980, the effectivity date of RCRA regulation of nonradioactive Federal hazardous waste. The 300 Area WATS is a tank system that was used to treat and store nonrecoverable uranium-bearing waste acid from reactor fuel fabrication operations. Waste acid neutralization occurred in portions of what now is the 300 Area WATS before operation of the system as a RCRA unit. This closure plan will focus on closure of RCRA components and areas, and on contamination resulting from RCRA operations. This unit is located in the 300 Area of the Hanford Site and is comprised of portions of four buildings and two tank farms: the 334-A Building, the 313 Building, the 303-F Building, and the 333 Building, and the 334 and 311 Tank Farms. Because reactor fuel manufacturing no longer occurs on the Hanford Site, the 300 Area WATS will be closed. This plan identifies the activities necessary to close the unit.

The 300 Area WATS is proposed to be clean closed to the performance standards of *Washington Administrative Code* (WAC) 173-303-610 and WAC 173-303-640 with respect to all dangerous waste, materials, and media (i.e., soil) contaminated from operation of the 300 Area WATS as a RCRA unit. Consistent with Washington State Department of Ecology (Ecology) guidance for clean closure of RCRA tank systems provided in *Guidance for Clean Closure of Dangerous Waste Facilities* (Ecology 1994), this plan proposes use of a 'clean debris surface' as the decontamination standard for tank system components and structures that will remain at the unit after closure. It also will be the treatment standard for hazardous debris generated during closure that will be treated at the unit prior to disposal. For hazardous debris treated at the unit, a clean debris surface will be achieved using an appropriate physical

1 extraction technology from Table 1, Alternative Treatment Standards for
2 Hazardous Debris (40 Code of Federal Regulations [CFR] 268.45). This standard
3 will be verified through documented, visual inspections. For materials not
4 removed from the unit during closure, this standard may be achieved through
5 decontamination in-place using any method that will achieve a clean debris
6 surface. Decontamination or treatment of these materials to the visually
7 verifiable standard of a clean debris surface will reduce closure costs by
8 minimizing the volume of material going to dangerous waste storage and by
9 eliminating sampling and decontamination iterations for debris.

10
11 The 300 Area WATS is within the 300-FF-2 (source) and 300-FF-5
12 (groundwater) operable units (OU), as designated in the *Hanford Federal*
13 *Facility Agreement and Consent Order* (Tri-Party Agreement)
14 (Ecology et al. 1994a). The 300-FF-2 and 300-FF-5 OUs are scheduled to be
15 remediated using the *Comprehensive Environmental Response, Compensation, and*
16 *Liability Act of 1980* (CERCLA) remedial investigation/feasibility study
17 (RI/FS) process. Any remediation of groundwater or soil contamination within
18 the areal extent of these OUs, although not expected as a result of 300 Area
19 WATS RCRA operations, would occur under these RI/FS processes.

20
21 The concrete pipe trenches between 300 Area WATS facilities that contain
22 300 Area WATS (and other systems') piping, and the 300 Area Process Sewer (PS)
23 system, also will be investigated by the CERCLA RI/FS process for the
24 300-FF-2 OU. Remediation and closure of the pipe trenches and the 300 Area PS
25 are outside the scope of this closure plan and will not affect 300 Area WATS
26 closure.

27
28 Potential contamination at 300 Area WATS locations, identified by the
29 closure process as predating RCRA operations or originating from non-RCRA
30 systems or components, will be addressed by a facility decommissioning work
31 plan at the time of final facility disposition. Information regarding such
32 contamination will be provided to the facility during the closure process.

33 34 35 1.2 300 AREA WASTE ACID TREATMENT CLOSURE 36 PLAN CONTENTS

37
38 The 300 Area WATS closure plan presents a description of the unit, the
39 history of waste managed, and the approach that will be followed to close the
40 unit. The 300 Area WATS closure plan consists of nine chapters as follows:

- 41
- 42 • Introduction (Chapter 1.0)
- 43 • Unit Description (Chapter 2.0)
- 44 • Process Information (Chapter 3.0)
- 45 • Waste Characteristics (Chapter 4.0)
- 46 • Groundwater Monitoring (Chapter 5.0)
- 47 • Closure Performance Standards (Chapter 6.0)
- 48 • Closure Activities (Chapter 7.0)
- 49 • Postclosure (Chapter 8.0)
- 50 • References (Chapter 9.0).
- 51

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

3
4
5 **1.2.1 Facility Description (Chapter 2.0)**
6

7 This chapter provides a brief description of the Hanford Site and the
8 location and description of the 300 Area WATS. Information on Hanford Site
9 security also is provided.

10
11
12 **1.2.2 Process Information (Chapter 3.0)**
13

14 This chapter describes how the 300 Area WATS stored and treated waste.
15

16
17 **1.2.3 Waste Characteristics (Chapter 4.0)**
18

19 This chapter discusses waste inventory and characteristics of the waste
20 treated at the 300 Area WATS.

21
22
23 **1.2.4 Groundwater Monitoring (Chapter 5.0)**
24

25 This chapter identifies that groundwater monitoring is not required for
26 300 Area WATS closure.

27
28
29 **1.2.5 Closure Performance Standards (Chapter 6.0)**
30

31 This chapter discusses closure strategy, performance standards for
32 protection of human health and the environment, and the steps that will be
33 taken to close the unit.

34
35
36 **1.2.6 Closure Activities (Chapter 7.0)**
37

38 This chapter identifies unit closure activities and procedures that will
39 be followed to implement and verify closure. This chapter also presents a
40 closure schedule and provides for closure certification.

41
42
43 **1.2.7 Postclosure (Chapter 8.0)**
44

45 This chapter identifies that postclosure activities are currently not a
46 requirement for closure of the 300 Area WATS.

1 1.2.8 References (Chapter 9.0)
2

3 References cited throughout this closure plan are listed in this chapter.
4 All references listed here that are not available from other sources will be
5 made available for review, upon request, to any regulatory agency or public
6 commentor. References can be obtained by contacting the following:
7

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

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2.0 FACILITY DESCRIPTION

This chapter provides a brief description of the Hanford Site and the 300 Area WATS TSD unit. Information regarding Hanford Site security also is provided.

2.1 GENERAL HANFORD SITE DESCRIPTION

In 1943, the U.S. Army Corps of Engineers selected the Hanford Site as the location for reactor and chemical separation facilities for the production and purification of plutonium. The Hanford Site (Figure 2-1) is a 1,450 km² (560 mi²) tract of semiarid land that is located adjacent to the city of Richland, Washington.

2.2 FACILITY DESCRIPTION AND OPERATIONS

The 300 Area WATS is a tank treatment and storage system for waste acid that is located in the 300 Area (Figure 2-2) of the Hanford Site. The 300 Area WATS is comprised of tanks, ancillary equipment, and secondary containment structures located in portions of the 334-A Building, 303-F Building, 333 Building, 313 Building, and the 311 and 334 Tank Farms. Transfer piping between the buildings is contained in covered concrete pipe trenches. These trenches are outside the scope of the 300 Area WATS closure. Figure 2-3 shows the location of the buildings and trenches. Each area and its components are further identified in Figures 2-4 through 2-9 and in Appendix 2A photographs.

Waste acids treated in the 300 Area WATS were generated during fuel fabrication operations in the 333 Building. Fuel fabrication process Tanks 7 and 11, which are located in the 333 Building, also were used to treat the waste acid by reducing chromium from Cr⁺⁶ to Cr⁺³. From the 333 Building, waste acids were piped to the 334-A Building where they were stored temporarily in Tanks A, B, C, or Tank 4 of the 334 Tank Farm. Tank 4 in the 334 Tank Farm already has been disposed of. The acids then were piped to the south room of the 313 Building, which was called the uranium recovery area, for neutralization. Before 1985, the neutralized acid slurry was stored in Tank 40 of the 311 Tank Farm until being shipped by tanker truck to the 183-H Basins. After 1985, the slurry underwent solids separation at the 313 Building through the combined use of a centrifuge and a filter press. Solids from the centrifuge were drummed for transport to the 303-K Radioactive Mixed Waste Storage Facility or the 200 Area Low-Level Burial Grounds for disposal. Solids from the filter press were not considered waste and were drummed for offsite uranium recovery. The 313 Building effluents were pumped to Tanks 40 and 50 in the 311 Tank Farm for storage until they were offloaded onto tanker trucks for disposal. Waste was circulated between Tanks 40 and 50 and sometimes back to the 313 Building by pumps located in the 303-F Building.

2.2.1 333 Building Description

The 300 Area WATS components of the 333 Building are Tanks 7 and 11 (Figures 2-4 and 2A-1), and the 5-centimeter (2-inch) polyvinyl chloride (PVC) drain piping from these tanks and from tanks shown in Figure 3-1 that also drained waste acid to the 334-A Building storage tanks. Tanks 7 and 11 are square, uncovered metal tanks that were used for chrome reduction treatment.

Sawcuts exist in the floor near Tanks 7 and 11. They are filled with what looks to be a heavy crack sealant material. The origin and depth of the sawcuts are unknown.

2.2.2 334-A Building Description

The 300 Area WATS areas and components of the 334-A Building (Figure 2A-2) are identified in Figure 2-5. The building shell was moved to this location and renovated in 1974 into the present 334-A Building. The dimensions of the 334-A Building are 11.77 meters (38.6 feet) by 5.58 meters (18.3 feet). The above-grade area of the building (Figure 2A-13) is used only for general storage of nonhazardous products. The below-grade area (tank pit) housed piping and components used to transfer and store waste acid.

The tank pit contains three tanks: Tanks A, B, and C (Figure 2A-3). Tank A is a vertical tank with a capacity of 1,135.6 liters (300 gallons). In 1988, the tank was cleaned and its PVC liner was removed and disposed of. Tanks B and C, which have a capacity of 7,570.8 liters (2,000 gallons) each, are horizontal cylindrical tanks of high-density polyethylene construction supported below-grade by stainless-steel saddles. These tanks are 3.54 meters (11.6 feet) long and 1.77 meters (5.8 feet) in diameter (outside dimensions) and sit approximately 51 centimeters (20 inches) above the floor. Tank wall thicknesses are unknown, but are highly variable as a result of molded plastic construction. A manhole with a stainless-steel cover is located on the top of each tank above the normal acid levels. Electrode-type high-level alarms and float-and-cable level indicator systems remain in the tanks. As dangerous waste tanks, inspections of each tank, adjacent piping, and surrounding areas were performed weekly to check for damage, deterioration, or leakage. The completed inspection forms are filed in the 333 Building.

The tank pit is a 5.7-meter (18.7-feet)-long, by 5.58-meter (18.3-feet)-wide, by 3-meter (10-feet)-deep pit that serves as a containment basin in the event of tank or piping failure. The pit is covered by a metal grate and is constructed of reinforced concrete with a glass-filled polyester acid-resistant coating on the floor and lower 61 centimeters (2 feet) of the walls. The tank pit originally was coated with Carboglas¹ 1601 SG. In 1987, the floor and bottom 5 centimeters (2 inches) of the walls were overcoated with Semstone² 884. Currently, a coating of 5-centimeter (2-inch) styrofoam

¹Carboglas is a trademark of the Carboline Company.

²Semstone is a trademark of Century Polymer Company.

1 insulation, which is overlaid with 2-centimeter (.75-inch) cement slurry and
2 wire mesh, begins 2.5 centimeters (21 inches) from the pit floor and rises to
3 the bottom of the grate covering.

4
5 The floor drain to the PS was fitted with a removable PVC plug in 1986 to
6 prevent the entry of acids into the sewer in the event of a spill. Before the
7 use of the PVC plug, a 61-centimeter (2-foot)-high PVC standpipe was installed
8 in the floor drain.

9
10 The waste acid transfer lines between the 333, the 334-A, and the
11 313 buildings are of PVC construction and are contained in covered concrete
12 pipe trenches totalling about 195 meters (640 feet) in length. A plastic pump
13 (since removed) located in the 334-A Building pit transferred the waste acid
14 through a 294-meter (960-feet)-long, 5-centimeter (2-inch)-diameter pipe from
15 the 334-A Building tanks to Tank 2 in the 313 Building for neutralization.

16 17 18 2.2.3 334 Tank Farm Description

19
20 The 300 Area WATS portion of the 334 Tank Farm (Figures 2A-4 and 2A-5) is
21 the concrete pad and drainage trench identified in Figure 2-7. This pad is
22 located directly below where Tank 4 (Figure 2A-5) of the 334 Tank Farm
23 previously existed. Tank 4 was a carbon steel tank that usually was empty but
24 was kept available as an overflow tank for the tanks in the 334-A Building.
25 In 1986, Tank 4 failed near the top, and in 1988, it was removed, cleaned, and
26 buried in the 200 Area Low-Level Burial Ground. The pad is bermed on the
27 north and east sides and slopes toward the drainage trench. The drainage
28 trench connects to a pipe trench that discharges to the PS. This drainage
29 trench is covered with a perforated metal plate.

30 31 32 2.2.4 313 Building Description

33
34 The 300 Area WATS components are contained in one room of the
35 313 Building (Figure 2-6), called the uranium recovery area. The entire
36 313 Building was constructed on a single concrete slab. Currently, all tanks
37 in this room are surrounded by 22-centimeter (8.5-inch)-high berms that have
38 been installed through the years to contain spills. The berms are identified
39 in Figure 2-6 and divide the room into four separate bermed areas.

40 41 2.2.4.1 Bermed Areas

42
43 The oldest bermed area is located in the northwest corner of the room and
44 dates from 1953. This area contains 300 Area WATS Tanks 2 and 5. The berm
45 and the concrete floor are covered with acid split brick. Acid split brick is
46 half brick with a glazed coating that was intended to be impervious to spilled
47 acid. The acid brick originally was painted yellow with Amercoat³. A
48 drainage trench running east-west the length of this area contains a sump
49 that, until 1987, allowed spills to drain to the PS. The drainage trench is
50 covered with removable cast-iron alloy metal grates. The trench originally
51 was covered with acid brick, but now is lined with a stainless steel catch pan

52 ³Amercoat is a trademark of American Paint Corporation.

1 that was installed in the early 1970's during floor repairs (BHI 1993).
2 In 1987, the sump was backfilled with concrete, and the drain to the PS was
3 plugged.

4
5 The second bermed area was created in 1983 when a berm was built around
6 the filter press. The floor in this area is not covered with acid brick.
7 It currently is covered with an unidentified, blue-colored coating. The berm
8 is coated with an acid-resistant epoxy paint. Condensate drain piping from
9 equipment in bermed areas 1 and 2 is routed to a protruding floor drain.
10 The floor drain discharges to a sump located in an unbermed, open area of the
11 floor at the east end of the room.

12
13 The third bermed area was created in 1985 when a berm was built around
14 the newly installed centrifuge. The berm and floor are coated with an epoxy
15 floor covering over .32 centimeters (3/8 inches) of Semstone. The sump
16 originally drained to the PS and is covered with a cast-iron grate. In 1987,
17 the sump was backfilled with concrete and the drain to the PS was plugged.

18
19 The fourth bermed area was created in 1987 when berms were built around
20 Tanks 9 and 10 and an east-west running trench, as part of Project H-685.
21 A contiguous area of the floor beneath Tanks 9 and 10, and the drainage trench
22 in this area, had already been covered with acid split brick in 1953. This
23 area was sandblasted before constructing the berm and recoating the floor with
24 Semstone. The trench contains a sump that was backfilled with concrete
25 in 1987, plugging the drain to the PS. The trench is covered with removable
26 cast-iron alloy metal grates and is lined with a stainless steel catch pan
27 that is similar to the liner installed in the early 1970's in bermed area 1.
28 The floor around the tanks was sloped to drain to the trench.

29
30 A sump exists at the east end of the room, which originally drained to
31 the PS and is not in one of the bermed areas. This sump also was backfilled
32 with concrete, and the drain lines to the PS plugged in 1987. The sump
33 appears to be bare concrete covered with a cast iron metal grate.

34 35 2.2.4.2 313 Building Components and Piping

36
37 Tank 2 (Figure 2A-7) is a vertical, cylindrical tank with a nominal
38 capacity of 5,678.18 liters (1,500 gallons) and a small top inspection plate.
39 An external water jacket surrounds 80 percent of the sidewall and provides
40 cooling of the neutralization reaction. The tank is constructed of Type 347
41 stainless-steel with 1.3-centimeter (0.5-inch)-thick bottom and sidewalls.
42 The tank is equipped with a float-and-cable level indicator with a high-level
43 alarm and pump cut-off. An encapsulated tilt switch, which is suspended in
44 the top of the tank, provides an alarm to indicate overfilling of the tank.
45 The tank is 271.78 centimeters (8 feet, 11 inches) in height and
46 172.72 centimeters (5 feet, 8 inches) in diameter.

47
48 Pump P2 was used as a recirculation pump during neutralization in Tank 2.
49 From January 1975 to November 1985, Pump P2 transferred neutralized slurry
50 from Tank 2 through a 5-centimeter (2-inch)-diameter stainless-steel line to
51 Tank 40 in the 311 Tank Farm. After that time, it pumped Tank 2 waste to a
52 metal centrifuge (Figure 2A-10), installed in November 1985, to separate

liquids and solids. It could treat a maximum of 11,356.2 liters (3,000 gallons) of waste per day, but generally operated at a rate much less than maximum capacity.

Tank 11 (Figure 2A-6) was installed in 1985. It is a square, 984.2-liter (260-gallon) tank with a flat, sloped bottom and a loose lid. The tank was used as an effluent receiving tank for the centrifuge. The tank has a shell that is constructed of 304-L stainless-steel (which is designed to provide support only and is not intended as a liquid barrier) and is lined with 0.64 centimeters (0.25 inches) of PVC. A high-level and low-level electrode-type level control provides control of Transfer Pump P9, which transferred effluent from Tank 11 to Tank 5 or Tanks 40 and 50 in the 311 Tank Farm. Inside, the tank is 122 centimeters (48 inches) long, 122 centimeters (48 inches) wide, and 94 centimeters (37 inches) high.

Tank 5 (Figure 2A-7) is the filter-press feed tank. Tank 5 is a 2,498.4-liter (660-gallon), vertical, cylindrical tank with a flat, sloping bottom and a vented flat lid. Construction is listed as 18-8 Cb-type stainless-steel with a wall and base thickness of 0.64 centimeters (0.25 inches). An external steam coil and sidewall insulation also are present. The tank is equipped with a tilt-switch, high-level sensor. The tank is 1.6 meters (5 feet, 4 inches) in diameter, 1.4 meters (4 feet, 7 inches) high, and 5.1 meters (16 feet, 9 inches) in circumference.

Pump 7 (Figure 2-6) was used to force the slurry through the plate-and-frame filter press (Figure 2A-8). The filter press frame is constructed of cast iron. The plates were cast iron until the early 1980's, when they were replaced with polypropylene plates. The press can treat a maximum of 4,542.5 liters (1,200 gallons) per day.

Tanks 9 and 10 (Figure 2A-9) are rectangular, 2,119.83-liter (560-gallon) tanks with hinged covers. These tanks did not enter operations as WATS components until 1985. They were used primarily for emergency storage of clarified, room temperature filter press effluent before its transfer to chemical waste storage tanks. The wetted portions are constructed of .51-centimeter (3/16-inch)-thick monel, with a metal skin that protects the exterior insulation on the sidewalls and bottoms. Overfill alarm tilt-switches are suspended near the top of the tanks. An air diaphragm pump (P8) can transfer liquid from Tanks 9 or 10 to any of several locations within the 313 Building, including Tank 5 and to Tanks 40 and 50 in the 311 Tank Farm. The tanks are 2.54 meters (8 feet, 4 inches) long, 1 meter (3 feet, 4 inches) wide, and 1.25 meters (4 feet, 1 inch) high.

Before their use as WATS effluent tanks (1953 to 1971), Tanks 9 and 10 contained a boiling caustic bath for stripping aluminum cladding from fuel assemblies. The ventilation hoods above Tanks 9 and 10 were connected to a roof fan that removed chemical fumes from the room and discharged them vertically about 7.6 meters (25 feet) above ground level (about 1.5 meters [5 feet] above the roof). The ventilation hoods have not been used for 300 Area WATS operations because Tanks 9 and 10 did not produce chemical fumes.

2.2.5 303-F Building Description

The 300 Area WATS areas and components of the 303-F Building (Figure 2A-11) are identified in Figure 2-8. The dimensions of the 303-F Building are 14 meters (46 feet) long, 7.6 meters (25 feet) wide, and 3 meters (10 feet) high. The building has a concrete floor with acid split brick in several areas and 30-centimeter (12-inch)-thick concrete-block walls. Three doors are present, one each on the north, west, and south sides.

The 300 Area WATS activities did not begin in this building until November 1985. At that time, two pumps, two cartridge filters, two sample ports, and the piping (Figure 2A-12) were installed in the 303-F Building pumphouse to serve new Tank 50 and existing Tank 40. These components are located within two adjacent stainless steel catch pans used to line a pre-existing catch basin. The taps of the catch basin walls are lined with acid brick. They are used to recirculate and filter solutions in Tanks 40 and 50, or to transfer solutions between Tanks 40 and 50 or back to Tank 5 in the 313 Building for further treatment.

2.2.6 311 Tank Farm Description

The 300 Area WATS portions of the 311 Tank Farm (Figure 2A-13) are identified in Figure 2-9. These areas are located inside separate concrete containment catch basins, which have no drains and permit the recovery of leaked solution.

Tank 40 was installed in 1953 and was used for storage of product nitric acid until 1973, when it was converted to neutralized waste storage. It is a horizontal, cylindrical, stainless-steel tank with a 15,141-liter (4,000-gallon) capacity that is supported by two concrete saddles. The tank has a diameter of 1.83 meters (6 feet) and a length of 7.25 meters (23 feet, 10 inches). Construction is of 304-L stainless-steel with .64-centimeter (0.25-inch)-thick walls and .84-centimeter (5/16-inch)-thick heads. Two manholes are provided at the top of the tank. The tank has external electric heat and full insulation for freeze protection. The tank has an air supply for agitation, if needed. A float-type level indicator installed in one manhole operates an overfill alarm. The support pad for Tank 40 is surrounded by a 60-centimeter (2-foot)-high concrete berm to contain any spillage. The floor of the Tank 40 catch basin was resurfaced with an acid-resistant, epoxy coating in 1988. Only minor spills (Table 3-2) were recorded during RCRA operations and before resurfacing.

Tank 50 was installed in a new concrete catch basin with an acid resistant coating in November 1985. Tank 50 is a vertical, cylindrical, 304-L stainless-steel tank with a capacity of 18,927 liters (5,000 gallons). The wall and head thickness of the tank is 0.64 centimeters (0.25 inches). The tank diameter is 2.87 meters (9 feet, 3 inches), and the height is 4 meters (13 feet, 1 inch). It has external electrical heat and full insulation for freeze protection. Two manholes are provided, one on top and one in the lower south side. The tank is equipped with a slow-speed mechanical agitator and an ultrasonic indicator that acts as an overfill alarm.

1 Solutions from Tanks 40 and 50 were pumped via Transfer Pump P10 into a
2 tank trailer and transported to the 340-B Building for shipment by railcar to
3 the 200 Area disposal facility, or were transported offsite for disposal.

4
5 The 311 Tank Farm currently contains a 15,141.6-liter (4,000-gallon) tank
6 used to store nitric acid, and two 37,854-liter (10,000-gallon) tanks used to
7 store sodium hydroxide. These tanks did not manage RCRA waste and are not a
8 portion of the 300 Area WATS closure.

10 11 **2.3 SECURITY INFORMATION**

12
13 The following sections describe the 24-hour surveillance system and
14 entry-control measures that provide security and restrict access to the
15 300 Area WATS.

16 17 18 **2.3.1 24-Hour Surveillance**

19
20 The entire Hanford Site is a controlled-access area. The Hanford Site
21 maintains around-the-clock surveillance to restrict unauthorized access for
22 the protection of the public and of government property, classified
23 information, and special nuclear materials. The Hanford Patrol maintains a
24 continuous presence of protective force personnel to provide Hanford Site
25 security.

26 27 28 **2.3.2 Barrier and Means to Control Entry**

29
30 Within the Hanford Site are operational areas to which access is
31 restricted. The 300 Area is one such operational area and is the location of
32 the 300 Area WATS. Access to the 300 Area is gained through one of three
33 unstaffed access points through a chain link fence. Unknowing entry by
34 individuals into the 300 Area, and subsequently to the vicinity of the unit,
35 is prevented administratively by postings on access roads and fences that
36 allow authorized access only. Authorized personnel are those individuals with
37 a U.S. Department of Energy (DOE)-issued security identification badge. Such
38 personnel are subject to a search of items carried into or out of these areas.
39 To preclude unknowing access into the unit by unauthorized individuals, the
40 334-A Building, 313 Building, and the 303-F Building are kept padlocked.
41 These buildings also are posted to allow entry by authorized personnel only
42 and to identify hazards presented by the facilities. The WATS area of the
43 333 Building and the 334 and 311 Tank Farms, which are outdoors, are roped off
44 and posted to allow authorized entry only.

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Figure 2-1. Hanford Site and Regional Map.

1

Figure 2-3. The 300 Area Waste Acid Treatment System.

JJA\030890-A

1
2 Figure 2-4. The 300 Area Waste Acid Treatment System Portion of the 333 Building.

F2-4

S9005109.1

Figure 2-5. The 300 Area Waste Acid Treatment System
Portion of the 334-A Building.

F2-5

Figure 2-6. The 300 Area Waste Acid Treatment System
Portion of the 313 Building.

Figure 2-7. The 300 Area Waste Acid Treatment System
Portion of the 334 Tank Farm.

F2-7

H95100139.5

Figure 2-8. The 300 Area Waste Acid Treatment System
Portion of the 303-F Building.

F2-8

Indicates Waste Acid Treatment System Components

a TCE = Trichloroethylene
b PCE = Perchloroethylene

JJA\022790-A

Figure 2-9. The 300 Area Waste Acid Treatment System
Portion of the 311 Tank Farm.

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FIGURE

3-1 The 333 Building Process Solution Tanks F3-1

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3-2 Known Spills During 300 Area Waste Acid Treatment System
RCRA Operations by Location T3-2.1

3.0 PROCESS INFORMATION

This chapter describes the 300 Area WATS history of operations, the 300 Area processes that generated the waste acid that was treated in the 300 Area WATS, and the 300 Area WATS treatment and storage process for the waste acid.

3.1 HISTORY OF SYSTEM OPERATIONS

The 300 Area WATS began partial operations in January 1973 with tank storage and treatment of waste acid and entered full operations in 1975. The 300 Area WATS did not begin operations as a RCRA TSD unit until November 19, 1980. The primary source of the waste acid was N Reactor fuel fabrication operations that occurred in tanks in the 333 Building from 1961 until 1987 (Figure 3-1). The waste acids from these operations that contained nonrecoverable uranium were treated in the 300 Area WATS. Because this acid waste contained small amounts of uranium, it is considered to have been a mixed waste as it entered the 300 Area WATS. However, from the beginning of 300 Area WATS RCRA operations, small quantities of waste acids and chemicals from other 300 Area and Hanford Site activities (Section 3.3) also were added and treated in the system as either mixed or dangerous waste.

Until April 1973, waste acid from the 333 Building had been neutralized in a 3,800-gallon underground tank that contained limestone and was located on the east side of the 333 Building. The neutralized acid was discharged from this tank to the PS. Between April and August 1973, this tank, along with Tank 4 of the 334 Tank Farm, was used to collect acid for transfer to the 313 Building for neutralization in the 300 Area WATS. When the underground tank developed a leak in August 1973, it was removed from service. From then until January 1975, waste acid was discharged directly to the 300 Area PS where it was neutralized. Beginning in January 1975, three new tanks in the 334-A Building stored waste acid until its transfer to the 313 Building for neutralization in Tank 2. After neutralization, the waste slurry was pumped to Tank 40, located in the 311 Tank Farm. Until November 1985, Tank 40 waste was transported to the 183-H Basins by tank trailer.

After November 1985, the neutralized waste acid underwent solids separation in the 313 Building by use of a centrifuge. The solids were containerized in the building for disposal at the 200 Area. The liquid effluent was pumped to Tank 40 or to the newly intalled Tank 50. Until March 1988, this effluent was taken from Tank 40 and Tank 50 by tanker truck to the 340-B Radioactive Liquid Waste System for storage while awaiting transport by railcar to the 200 Area Double-Shell Tank (DST) System for long-term storage. After March 1988 and until July 1995, the effluent was sent off of the Hanford Site. In July 1995, the last shipment of effluent from Tank 50 was pumped to a tanker truck and sent to the 200 Area DST System via the 340-B Building.

3.2 WASTE STORAGE AND TREATMENT PROCESSES

The following sections summarize the process information for each of the facilities included in the 300 Area WATS. This plan does not include those tanks and associated pumps and piping used solely for uranium recovery. Photographs of the facilities are shown in Appendix 2A.

Historical information regarding spills to the 300 Area WATS location that either predated RCRA operations or were from non-300 Area WATS components is presented for information only in Table 3A-1, Known Spills Predating 300 Area Waste Acid Treatment System RCRA Operations, and Table 3A-2, Known Spills from Non-300 Area Waste Acid Treatment System Activities, respectively. These non-RCRA spills will be addressed at the time of final disposition of affected locations in accordance with Hanford Site past practice processes (Section 1.1). Table 3-2 identifies spills to pipe trenches between the facilities that will be addressed at the time of final disposition of the trenches and are outside the scope of this closure plan (Section 1.1).

3.2.1 The 333 Building

The only 300 Area WATS components of the 333 Building are Tanks 7 and 11, and PVC drain lines from process Tanks 5, 7, 9, 10, 11, 13, 15, 19, 26, and 31 (Figure 3-1) to storage tanks in the 334-A Building. The 300 Area WATS portion of this piping begins at the drain valve that is below each of these process tanks.

The fuel fabrication operations that occurred in these process tanks included component cleaning, acid copper removal, end recessing chemical milling, prebraze cleaning, preweld cleaning, and final bright etch steps. Information regarding each tank's process, capacity, chemical output, and solution changeout schedule is presented in Table 3-1. The waste from these tanks was drained through the PVC drain lines to the 334-A Building Storage Tanks. The chemical output from these tanks primarily consisted of hydrofluoric, nitric, and sulfuric acids with copper, zirconium, chromium, and uranium in solution.

Only one known spill from the 300 Area WATS has occurred at this location in the 333 Building since the beginning of RCRA operations. This spill occurred August 17, 1981, and is described in Table 3-1. Sawcuts in the floor near Tanks 7 and 11, described in Section 2.2.1, likely were not exposed to this spill. A relatively small quantity, 397.5 liters (105 gallons), leaked from a defective drain valve directly under Tank 11 and would not have overcome the uphill slant of the floor to the drainage trench to reach the sawcuts or to have laterally spread beyond the width of Tank 11. Only one fine surface crack is visible in the floor in the vicinity of Tanks 7 and 11. This crack emanates from an area of concrete surface corrosion, but is too fine to have provided a pathway to soils of spilled effluents or to allow the escape of decontamination solutions (if applied).

3.2.2 The 334-A Building and the 334 Tank Farm (Storage)

Before 1975, the 334-A Building site was occupied by a 3,800-gallon underground neutralization tank containing limestone. In 1973, this tank failed and leaked waste acid solution to the soil. Characterization or remediation of soil with respect to this leak will be performed by the remedial action process for the 300-FF-2 OU. The 334-A Building was completed in late 1974 and entered service in January 1975 to replace the failed tank.

Three tanks (Tanks A, B, and C) in the 334-A Building were used to store waste acids from the 333 Building. Tank A, with a capacity of 360 gallons, was used as an inline settling tank. Tanks B and C, with a capacity of 2,000 gallons each, were used for storage. Waste gravity-drained from the 333 Building to the 334-A Building via PVC transfer pipe. The tanks received approximately 210,000 gallons of waste acids per year from the fuels fabrication process.

In the early 1980's, in an effort to reduce sludge build-up, the waste stream from the 333 Building was separated into copper-bearing and zirconium-bearing streams that were directed to Tanks B and C, respectively. In August 1984, the piping to Tank A was disconnected, and all wastes were routed directly to Tanks B or C.

The tank pit contains a spill sensor that was set to alarm at approximately 1.27 centimeters (0.5 inches) above the high point of the floor. If a leak occurred to the pit, an alarm sounded in the 333 Building Chem Bay. The collected solution was sampled and analyzed. If it was acidic, it was pumped into Tank A or B. If it was process water, it was released into the PS.

A plastic pump (now removed) in the 334-A Building pit transferred the waste acid through 293 meters (960 feet) of 5-centimeter (2-inch)-diameter PVC transfer pipe from the 334-A Building tanks to Neutralization Tank 2 in the 313 Building. The waste was pumped at a rate of approximately 5 to 10 gallons per minute to control the heat of neutralization.

Table 3-2 presents a description of spills that are known to have occurred in the 334-A Building portion of the 300 Area WATS since the beginning of RCRA operations.

One large spill occurred in the tank pit in June 1978 (Table 3A-1) when fluid levels rose above the 60-centimeter (2-foot)-high standpipe. This was caused when a process water fill line to a 333 Building process tank was left on for two days. Since the standpipe was removed and replaced with a PVC plug, there have been only minor spills, primarily leaks from valves or pump fittings. Tank exteriors, pit floor, and pit walls to approximately 60 centimeters (2 feet) above the floor, have been in contact with waste acid that was a result of accidental spills.

3.2.3 The 334 Tank Farm (Storage)

From 1975 to 1986, Tank 4 in the 334 Tank Farm was kept available for use as an overflow tank for the tanks in the 334-A Building. Although usually empty, Tank 4 was used to store waste acid solutions in January 1986 because of equipment problems in the 313 Building. Shortly after that transfer, Tank 4 developed holes near the top, and in the late summer of 1988, was removed and disposed of in the 200 Area Low-Level Burial Grounds. The 334 Tank Farm is outdoors and uncovered. Table 3-2 describes the only spill of waste acid that occurred at the 334 Tank Farm during RCRA operations which was from Tank 4 in 1986. Years of exposure to weather is expected to have rendered the uncovered surfaces of the tank support structure and pad essentially uncontaminated.

3.2.4 The 313 Building (Treatment and Storage)

Beginning full-time in January 1975, nonrecoverable uranium-bearing waste acids were pumped from the 334-A Building into Tank 2 in the 313 Building for neutralization with sodium hydroxide. Following neutralization, the metals in this waste (Table 7-1) were present primarily in the form of precipitates. Until 1985, the neutralized waste slurry was transferred to Tank 40 in the 311 Tank Farm.

In November 1985, a centrifuge was installed in the 313 Building to perform solids separation on the waste slurry. Solids from the centrifuge were drummed and transferred within 90 days to the 303-K Radioactive Mixed Waste Storage Facility for storage or to the 200 Area Low-Level Burial Grounds for disposal. A sample from each drum was taken for chemical analysis. Additionally, a composite sample of all drums in one neutralization tank run was analyzed for uranium. Sample results, along with the gross, tare, and net weight of each drum, were recorded in a logbook. A monthly composite sample of drummed material was analyzed and recorded for constituents such as chromium, copper, nitrate, and fluoride.

The liquid from the centrifuge was discharged to Tank 11. Pump 9 transferred effluent from Tank 11 to Tank 5 that fed a filter press used to further clarify the effluent. Effluent from the filter press flowed by gravity to Tanks 9 and 10, where it was visually examined for clarity and, if clear, was pumped to Tank 40 or Tank 50. If it was found to be cloudy, the effluent was pumped back to Tank 5 to be recycled through the filter press.

Until mid 1987, the solids from the filter press were included with the recyclable uranium-bearing sludge and were shipped to the Feed Material Production Center in Fernald, Ohio.

Table 3-1 describes known spillage to the 300 Area WATS portion of the 313 Building since the beginning of RCRA operations at this location. In the early 1970's, the PS under the floor on the west side of the room was found to have been leaking into the ground for an undetermined period of time, potentially contaminating the soil under the west side of the building with uranium, copper, and other substances (BHI 1993). This potential soil contamination will be addressed by Hanford Site past practice processes (Section 1.1).

1 **3.2.5 The 303-F Pumphouse (Waste Transfer**
2 **and Filtration)**
3

4 The 303-F Pumphouse began 300 Area WATS operations in November 1985.
5 Before this time, building pumps were used to transfer 50 percent sodium
6 hydroxide from tanks in the 311 Tank Farm to neutralization Tanks 2 and 6 in
7 the 313 Building. In November 1985, two new pumps, cartridge filters, and
8 sample ports were installed in the 303-F Pumphouse to recirculate and filter
9 waste acid solutions while in Tanks 40 and 50 of the 311 Tank Farm, and also
10 to transfer solutions back to Tank 5 in the 313 Building.
11

12 No spills to this location have been documented since the beginning of
13 300 Area WATS RCRA operations in November 1985. However, white residues are
14 visible on the filter cartridges, piping, catch basin liner, and acid brick
15 indicating a potential for surface contamination. The mortar between the acid
16 bricks that cap the basin shows numerous cracks that could have allowed
17 surface contamination to contact the concrete. Although not visible on the
18 white painted surface of the adjacent concrete block wall, the residues could
19 exist there also.
20

21
22 **3.2.6 The 311 Tank Farm (Storage and Treatment)**
23

24 From 1973 to 1985, neutralized 300 Area WATS and uranium-bearing system
25 effluents from the 313 Building were combined for storage and treatment in
26 aboveground Tank 40 in the 311 Tank Farm. In November 1985, Tank 50 was
27 installed in the 311 Tank Farm to also store neutralized effluent. Tank 50
28 also was used four times during 1986 and 1987 to decant wastes when the
29 centrifuge was out of service. Decanted effluents then were transferred to
30 Tank 40. The tanks received approximately 1,589,868 liters (420,000 gallons)
31 of waste solutions per year.
32

33 The neutralized effluent was stored in Tanks 40 and 50 until it was
34 pumped, transferred using Pump P10, to a tanker truck, and removed to the
35 340-B Building, where it was pumped into holding tanks for transport by
36 railcar to the 200 Area DST System for long-term storage. If below
37 radioactive release limits, it was transported to a TSD unit off of the
38 Hanford Site for disposal as dangerous waste.
39

40 A sample of each tank trailer load was taken for chemical analysis.
41 A logbook was kept on the volume of each load, the pH, the concentration of
42 sulfate and uranium, and on whether the liquid was free of particulate.
43 Additionally, the monthly environmental performance reports listed the amounts
44 and constituents of neutralized waste acid shipped to the 340-B Building or
45 offsite. A monthly composite sample was analyzed and recorded for
46 constituents such as chromium, copper, nitrate, sulfate, and uranium. This
47 information is presented in Table 4-1, "300 Area Waste Acid Treatment System
48 Slurry Shipped to 183-H Basins," and in Table 4-3, "300 Area Waste Acid
49 Treatment System Effluent Shipped to the 340-B Building and Offsite."
50

Table 3-2 describes known spills to the 300 Area WATS area of the 311 Tank Farm since the beginning of RCRA operations. Contamination from documented spills to the concrete catch basin for Tank 40 potentially have been covered over with surface coatings (Section 2.2.6). There were no documented spills to the Tank 50 Catch Basin, which was installed in 1989 and still retains its original surface coating. Preliminary inspections indicate no visual evidence of waste residues.

3.3 NONROUTINE CHEMICAL ADDITIONS

Beginning in 1975 and ending in 1988, waste acids and chemicals that were not from 333 Building operations were added to various locations of the 300 Area WATS. The additions that made during the RCRA time frame (since 1980) and the points at which the additions were made are documented in Chemical Waste Disposal Permits (CWDP) that are summarized in Table 4-4. Nonroutine chemical additions to the 300 Area WATS prior to RCRA operations are summarized in Appendix 4B. The CWDPs were initiated to identify radioactivity in the waste and to ensure compatibility with waste already in the system. The information on the CWDPs was obtained through process knowledge, container labels, and from spectrochemical analysis.

These waste additions consisted of used and unused acid and caustic chemical solutions from various operations in the 300 Area and across the Hanford Site. These wastes often contained dangerous waste constituents (e.g., heavy metals) and sometimes radionuclides (primarily uranium), and so could have been designated as mixed or dangerous waste upon addition to the system. The processes that generated these wastes included decontamination, electroplating, battery acid disposal, X-ray film development, various research and development projects, and fuel fabrication (other than routine 333 Building processes).

Until early 1986, these wastes were added to the treatment system at Tanks 9 and 10 in the 313 Building or at previously existing Tanks 12, 14, 15, and 16 in the old 313 Building cleanup line. Waste added at Tanks 9 and 10 was transferred directly to the 311 Tank Farm. Waste that was added to non-300 Area WATS Tanks 12, 14, 15, and 16 in the old 313 Building cleanup line may have been pumped back to the 334-A Building for further treatment and at that point would have become 300 Area WATS waste.

Beginning in August 1986, waste was added to the system using a barrel pump as follows: (1) directly to Tanks 10 or 19 in the 313 Building, (2) directly to Tanks B or C in the 334-A Building, or (3) to Tank 2 in the 313 Building. The actual addition point in this latter timeframe is indeterminate because the CWDPs listed allowable system addition points and did not specify the addition point actually used.

RL005-01

Figure 3-1. The 333 Building Process Solution Tanks.

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Table 3-1. Description of Building 333 Chemical Process Tanks. (sheet 1 of 3)

Tank number/ description	Process	Capacity (Gal)	Example of solution qty. for 1 yr. (gal)	Chemical input	Primary chemical output	Example of output qty. for 1 yr. (lb)	When solution changed
2-Cold HNO ₃ ^a etch	Uranium-billet cleaning	105	1,113	HNO ₃	UO ₂ (NO ₃) ₂ ^b HNO ₃	81 3,996	0.3 lb uranium/gal
4-Hot HNO ₃ etch	Uranium-billet cleaning	105	2,449	HNO ₃	UO ₂ (NO ₃) ₂ HNO ₃	2,432 15,940	1 lb uranium/gal
5-Zircaloy-2 component etch	Cleaning of Zircaloy- 2 rolled stock, clad shells, end caps, cast braze rings, and support hardware	473	6,518	HNO ₃ HF ^c	Cr(NO ₃) ₃ ^d Fe(NO ₃) ₃ ^e H ₂ ZrF ₆ HF HNO ₃	12 28 3,583 1,141 20,812	0.3 lb zirconium/gal
7-Water rinse	Water rinse after cleaning in Tank 11	105		None	NA	NA	
9-Copper/Cu-Si component etch	Copper and copper- silicon component cleaning	255	4,054	HNO ₃ HF	Cu(NO ₃) ₂ ^g Mn(NO ₃) ₂ ^h SiO ₂ HF HNO ₃	1,602 24 64 2,202 16,194	1 lb copper/gal
10-Copper strip	Copper-silicon removal	578	33,697	HNO ₃	Al(NO ₃) ₃ ^j Cu(NO ₃) ₂ ^k Fe(NO ₃) ₃ ^l Mn(NO ₃) ₂ ^m NaNO ₃ SiO ₂ H ₂ ZrF ₆ UO ₂ (NO ₃) ₂ HNO ₃	174 132,254 74 1,007 414 3,253 191 614 82,558	When Cu-Si removal rate is too slow
11-Zinctone* copper brightener	Copper and copper- silicon component cleaning	105	210 ^l	CrO ₃ ^m H ₂ SO ₄ ⁿ Na ₂ SO ₄ ^o HNO ₃	Cr ₂ (SO ₄) ₃ ^p CuSO ₄ ^q Na ₂ SO ₄ HNO ₃ H ₂ SO ₄	151 161 272 36 132	Twice a year

*Turco Products

Table 3-1. Description of Building 333 Chemical Process Tanks. (sheet 2 of 3)

Tank number/ description	Process	Capacity (Gal)	Example of solution qty. for 1 yr. (gal)	Chemical input	Primary chemical output	Example of output qty. for 1 yr. (lb)	When solution changed
13-Zircaloy- 2 etch (for rework fuel)	Prebraze etch	360	1,526	HNO ₃ HF	Fe(NO ₃) ₃ H ₂ ZrF ₆ HF HNO ₃	12 781 180 5,426	0.3-0.4 lb zirconium/gal
15-Zircaloy- 2 etch	Prebraze etch; bell jar cleaning	473	20,557	HNO ₃ HF	Cr(NO ₃) ₃ Cu(NO ₃) ₂ Fe(NO ₃) ₃ Ni(NO ₃) ₂ SiO ₂ H ₂ ZrF ₆ HF HNO ₃	69 25 147 20 21 13,777 3,104 69,234	0.3-0.4 lb zirconium/gal
16 ^U -Uranium etch	Prebraze etch; bell jar cleaning	177	2,814	HNO ₃ Al(NO ₃) ₃	Al(NO ₃) ₃ Fe(NO ₃) ₃ UO ₂ (NO ₃) ₂ HNO ₃	352 13 262 17,955	0.7 lb uranium/gal
19-Zircaloy- 2 etch	Preweld etch, braze ring cleaning (optional)	473	13,727	HNO ₃ HF	Al(O ₃) ₃ Cr(NO ₃) ₃ Fe(NO ₃) ₃ Ni(NO ₃) ₂ SiO ₂ H ₂ ZrF ₆ Be(NO ₃) ₂ HF HNO ₃	50 26 130 14 19 9,045 24 2,183 46,727	0.3-0.4 lb zirconium/gal
25 ^U -Static water rinse	Copper strip and chemical milling rinse	140	11,130	None	Cu(NO ₃) ₂ H ₂ SO ₄ UO ₂ (NO ₃) ₂ HNO ₃	1,151 1,233 462 962	One or two times per week
26-Final etch	Final bright etch	473	11,532	HNO ₃ HF	Cr(NO ₃) ₃ Fe(NO ₃) ₃ Ni(NO ₃) ₂ SiO ₂ Be(NO ₃) ₂ HF HNO ₃ H ₂ ZrF ₆	49 14 15 17 31 1,903 31,078 7,573	0.3-0.4 lb zirconium/gal
31-Spare HNO ₃ tank	Decontamination of fuels	208	Minimal - tank is used infrequently.				

Table 3-1. Description of Building 333 Chemical Process Tanks. (sheet 3 of 3)

Tank number/ description	Process	Capacity (Gal)	Example of solution qty. for 1 yr. (gal)	Chemical input	Primary chemical output	Example of output qty. for 1 yr. (lb)	When solution changed
32 ^U -Chemical milling	Chemical milling	907	27,881	HNO ₃ H ₂ SO ₄	Cr(NO ₃) ₃ Cu(NO ₃) ₂ Fe(NO ₃) ₃ UO ₂ (NO ₃) ₂ HNO ₃ H ₂ SO ₄	27 41 303 26,540 30,318 128,415	1 lb uranium/gal

^BHNO₃ = nitric acid.
^CUO₂(NO₃)₂ = uranyl nitrate.
^DHF = hydrofluoric acid.
^ECr(NO₃)₃ = chromic nitrate.
^FFe(NO₃)₃ = ferric nitrate.
^GH₂ZrF₆ = hydrogen hexafluorozirconate.
^HCu(NO₃)₂ = cupric nitrate.
^IMn(NO₃)₂ = manganese nitrate.
^JSiO₂ = silicon dioxide.
^KAl(NO₃)₃ = aluminum nitrate.
^LNaNO₃ = sodium nitrate.
^MBefore reducing Cr⁺⁶ to Cr⁺³ in Tanks 7 and 11
^NCrO₃ = chromic acid.
^OH₂SO₄ = sulfuric acid.
^PNa₂SO₄ = sodium sulphate.
^QCr₂(SO₄)₃ = chromic sulfate.
^RCuSO₄ = cupric sulfate.
^SNi(NO₃)₂ = nickel nitrate.
^TAl₂O₃ = aluminum oxide.
^UBe(NO₃)₂ = beryllium nitrate.
 This tank discharged to the uranium-bearing system.

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Table 3-2. Known Spills During 300 Area Waste Acid Treatment System RCRA Operations
by Location. (sheet 1 of 7)

Location	Date	Spill Origination point	Material Spilled	Chemical constituents	Quantity spilled	Description of event	Cleanup action	Comment
333 Building	08/17/81	Tank 11	Newly mixed acid solution	HNO_3^a , H_2SO_4^b , and CrO_3^c acid solution	105 gal	Slow leak from defective drain valve.	Drained to process sewer.	This could have released 20 lbs. of Cr^{+6} to the process sewer.
334-A Building	09-16-82	Pipe trench between 334-A Building and 333 Building in component cleaning area.	Waste etch acids	HNO_3 , HF, H_2SO_4 , and CrO_3 acids containing uranium, copper, and zirconium in solution	Exact quantity unknown. However, more than 100 gal was discharged.	The PVC ¹ waste acid transfer line broke, resulting in discharge to the process sewer. Weekly process sewer sample for the 333 Building showed elevated copper levels (3.9 ppm).	Pipe was repaired. Flushed leak area into process sewer.	Comparing the copper content in the weekly process sewer sample (3.9 ppm) with a normal average concentration (0.3 ppm), it appears that 82 lb of copper could have been released in this event. This would indicate that the current CERCLA ¹ RQ ^K for $\text{Cu}(\text{NO}_3)_2^1$ (100 lb) would have been exceeded with this spill.
	11-22-82	334-A Building - storage tanks	Waste etch acids	HNO_3 , HF, H_2SO_4 , and CrO_3 acids containing uranium, copper, and zirconium metals in solution	Exact quantities unknown (see comments)	In attempting to backflush a transfer line to clear blockage, water was discharged into storage tanks, causing overflow. Weekly 333 process sewer sample showed an elevated level of fluoride (4.1 ppm).	Spilled solution was flushed into process sewer.	Based on average F ⁻ content of 1.4 ppm (weekly process sewer composite sample). 75 lb of HF could have been involved in the spill. Copper content in weekly composite sample also was elevated (1.7 ppm vs 0.4 ppm in a normal week) indicating that 35 lb of copper ion (105 lb $\text{Cu}(\text{NO}_3)_2$) could have been discharged in the spill event. The process sewer stream pH was 1.3 to 2.0 for ~45 min during the course of the spill. This would indicate a release of up to 350 lb of HNO_3 (assuming a process sewer stream flow of 500 gal/min). The current CERCLA RQs are: HF (100 lb), $\text{Cu}(\text{NO}_3)_2$ (100 lb), HNO_3 (1,000 lb).
	1-03-83	334-A Building - storage tanks	Waste etch acid	HNO_3 , HF, H_2SO_4 , and CrO_3 acids containing uranium, copper, and zirconium in solution	1,500 gal	A siphon condition was established in the overflow piping on Tank 10. Acid was added to Tank 10 at the same time solution from Tank 26 was run into the waste piping system. As a result, the overflow piping remained submerged and continued to siphon through the waste piping and into the 334-A tanks. The B and C tanks overflowed into the pit area.	Acid was pumped from building pit to a tank truck. Modifications were made to system to prevent future spills by siphoning.	No discharges to the process sewer.

Table 3-2. Known Spills During 300 Area Waste Acid Treatment System RCRA Operations
by Location. (sheet 2 of 7)

Location	Date	Spill Origination point	Material Spilled	Chemical constituents	Quantity spilled	Description of event	Cleanup action	Comment
334-A Building (cont)	1-05-83	334-A Building - storage tanks storage	Waste etch acids	HNO ₃ , HF, H ₂ SO ₄ , and CrO ₃ acids containing uranium, copper, and zirconium in solution	200 gal	When Tank 15 was drained to the 334-A Building, the B and C tanks overflowed. Depth gages did not work properly.	Acid was cleaned up and not allowed to enter the process sewer.	Depth gages and high-level alarms were recalibrated.
	08-15-83	334-A Building - storage tanks	Waste etch acids	HNO ₃ , HF, and H ₂ SO ₄ acids containing copper, uranium, and zirconium in solution	Approximately 100 gal of acid solution	333 Building process sewer analyses showed elevated levels of copper (2.2 ppm). Apparent cause was clean out of storage tanks in 334-A Building. Pump used to transfer material from tanks was leaking; leakage was discharged into process sewer.	None.	Based on normal average copper content in weekly process sewer sample of 0.3 ppm and using a total process sewer flow of 2,874,700 gal, it is estimated that 45 lb of copper could have been involved in this release. This corresponds to 135 lb expressed as Cu(NO ₃) ₂ .
	10-27-83	334-A Building - storage tanks	Waste etch acids	HNO ₃ , HF, and H ₂ SO ₄ acids containing copper, uranium, and zirconium in solution	Unknown volume. See description of event and comment columns for estimated weights.	Following desludging of the 334-A storage tanks, leak testing with water is routinely pursued. The water used for this effort is then discharged into the process sewer. In the 10-27-83 effort, one of the tanks had apparently not been desludged and the leak test solutions (containing the waste acids and crystalline sludge) was mistakenly discharged into the process sewer. The weekly 333 process sewer sample showed elevated levels of fluoride (15.8 ppm) and copper (3.6 ppm) and a low pH (2.87).	When operator recognized that acidic solution was being discharged, the release was halted.	Based on the weekly process sewer composite sample, and using normal average values for fluoride (1.2 ppm), copper (0.3 ppm) and pH (3.8), the release could have involved as much as 500 lb of HF, 100 lb of copper, and 860 lb of HNO ₃ . Total weekly process sewer flow averages 3,940,800 gal. Current CERCLA RQs for these materials are HF (100 lb), Cu(NO ₃) ₂ (expressed as copper) (34 lb), HNO ₃ (1,000 lb).
	08-29-85	Pipe trench between 333 Building and 303-F Building. West side of 333 Building.	Waste etch acids	NO ₃ , HF, and H ₂ SO ₄ acids containing uranium, copper, and zirconium metals in solution	Apparently a small quantity	Leak testing of PVC acid transfer system revealed a leak in the line. This leak had spilled onto a carbon steel pipe below, corroding the line and resulting in spillage of the trench heating system solution (ethylene glycol) contained therein.	Material remaining in pipe trench (that which hadn't reached process sewer) was neutralized, absorbed, and cleaned up.	Acidic solution reaching process sewer was apparently of low quantity, as weekly process sewer composite sample did not show any attributable increases in levels of NO ₃ ⁻ , F ⁻ , or copper or any decrease in pH. (Indicates that release was insignificant in comparison with routine operational discharges.)
		See above.	Trench heating system solution	50% ethylene glycol solution	50-75 gal	See above.	Piping leaks were repaired.	—

Table 3-2. Known Spills During 300 Area Waste Acid Treatment System RCRA Operations
by Location. (sheet 3 of 7)

Location	Date	Spill Origination point	Material Spilled	Chemical constituents.	Quantity spilled	Description of event	Cleanup action	Comment
334-A Building (cont)	01-02-86	334 Tank Farm - Tank 4	Waste etch acids	HNO ₃ , HF, and H ₂ SO ₄ acids containing copper, uranium, and zirconium in solution	Approximately 350 gal of solution containing 170 lb of HF acid	Failure of liner in waste acids storage tank resulted in corrosion of carbon steel shell, followed by acid leakage into the process sewer.	The tank contents were removed to prevent further discharge. Approximately 60 gal of 50% NaOH was discharged into the process sewer in an attempt to maintain a caustic pH at the process trenches. Special groundwater monitoring was initiated at 300 Area wells to determine impact of release. Spill area was flushed into the process sewer.	Release was reported as CERCLA RQ event due to HF quantity, which exceeded CERCLA RQ of 100 lb. Based upon comparison of average weekly process sewer composite sample levels with levels measured for the week of the spill, it is estimated that the release also involved 700 lb of HNO ₃ (79 ppm vs 57.5 ppm in a typical week); 16 lb of copper (0.7 ppm vs 0.2 ppm typical); and 20 lb of uranium (0.9 ppm vs 0.27 typical). (Estimates are based upon process sewer flow of 3,893,000 gal for the week.) Tank was taken out of service after leak and was removed, cleaned out, and buried in the 200 Area in September 1988.
	01-17-86	334-A Building	Waste etch acids	HNO ₃ , HF, and H ₂ SO ₄ acids containing copper, uranium, and zirconium in solution	10 - 15 gal	Outlet hose on Feed Pump 2 came off during waste acid pumping operations resulting in acid spill.	Pump was stopped and hose reattached. Waste acids were cleaned up.	No discharges into the process sewer.
	02-25-86	334-A Building	Waste etch acids	HNO ₃ , HF, and H ₂ SO ₄ acids containing copper, uranium, and zirconium in solution	Small quantity	A discharge hose for the acid transfer Pump 1 cam loose from pump allowing the acid to spill into the pit near Pump 1. Spill resulted from improper clamping of hose and an unauthorized modification.	Pump was secured and taken out of service until repairs were completed.	No discharges into the process sewer, the two feed pumps were replaced with one pump that is connected by PVC piping - no flexible hoses.
	07-28-86	334-A Building	Waste etch acids	HNO ₃ , HF, and H ₂ SO ₄ acids containing copper, uranium, and zirconium in solution	Approximately 1 qt of acidic solution containing <1 lb of HNO ₃ and <1/2 lb of HF acid	Small leak in the spent etch acid transfer system resulted in release of a small quantity of material.	Spilled material was discharged into the process sewer.	Quantity involved was insignificant compared with CERCLA RQs for HNO ₃ (1,000 lb) and HF (100 lb). No attributable increase was seen in weekly process sewer composite sample, indicating that spill was insignificant compared to routine operational releases.

Table 3-2. Known Spills During 300 Area Waste Acid Treatment System RCRA Operations by Location. (sheet 4 of 7)

Location	Date	Spill Origination point	Material Spilled	Chemical constituents	Quantity spilled	Description of event	Cleanup action	Comment
334-A Building (cont)	02-23-88	334-A Bldg Building	Waste etch acids	HNO ₃ and HF acids containing copper, uranium, and zirconium in solution	About 1 qt	During maintenance activities, acid had been placed in a plastic jug which had a leak in it allowing acid to spill onto the floor.	Spill was washed into the process sewer.	Very small quantity of acid - would not be a reportable amount.
313 Building	Week ending 06-15-81	Uranium recovery area	Neutralized waste	NaNO ₃ ^m , Na ₂ SO ₄ ⁿ , NaF ^o , and Na ₂ Cr ₂ O ₇ ^p solution with precipitates of copper, uranium, and zirconium	Unknown	Process sewer analyses showed high nitrate (115 ppm) and high sulfate (100 ppm) values. No known spill discovered.	None.	Based upon a normal NO ₃ ⁻ content of 24 ppm and a total process sewer flow of 30,000 gal for the week, ~31 lb of NaNO ₃ could have been involved in this spill. There is no CERCLA RQ for NaNO ₃ .
	Week ending 08-17-81	Uranium recovery area	Neutralized waste	NaNO ₃ , Na ₂ SO ₄ , NaF, and Na ₂ Cr ₂ O ₇ solution with precipitates of copper, uranium, and zirconium	Unknown	Leak around pump shaft seal at the waste acid neutralization tank resulted in discharge into the process sewer.	Leaking shaft seal was replaced after the summer outage. Solution was washed into the process sewer.	The weekly process sewer composite sample showed an elevated pH compared to normal (10.1 vs 8.0) and a much elevated F ⁻ level compared to normal (5.1 ppm vs 0.2 ppm). Based upon a total weekly flow of 174,000 gal ~16 lb of NaF could have been involved in this discharge. This is well below the current CERCLA RQ limit of 1,000 lb of NaF.
	12-14-81	Uranium recovery area	Neutralized waste	NaNO ₃ , Na ₂ SO ₄ , NaF, and Na ₂ Cr ₂ O ₇ solution with precipitates of copper, uranium, and zirconium	Approximately 500 gal of solution	Valve left open at neutralizing tank pH meter, allowing neutralized spent acid solution to discharge into the process sewer.	pH value was closed, stopping the release. Solution washed into the process sewer.	Weekly process sewer sample showed F ⁻ level of 11.4 ppm; NO ₃ ⁻ level of 592 ppm; pH of 9.62. Based upon typical process sewer values for F ⁻ , it appears that the spill could have involved 41 lb of NaF. This value is well below the current CERCLA RQ for NaF of 1,000 lb.
	06-20-83	Uranium recovery area	Neutralized waste	NaF, NaNO ₃ , and Na ₂ SO ₄ solution with precipitates of copper, chromium, uranium, and zirconium	Unknown (small quantity)	Leaking packing at neutralization tank pump resulted in release to the process sewer. Weekly 313 process sewer sample showed elevated levels of fluoride (6.3 ppm) and copper (2.2 ppm).	Pump packing was repaired. Solution washed into the process sewer.	Based upon the normal average weekly composite sample F ⁻ content of 0.4 ppm, and the normal average copper content of 0.1 ppm, it is estimated that 28 lb of NaF and 4 lb of copper could have been involved in this release (254,000 gal total process sewer flow). The CERCLA RQ for NaF is 1,000 lb, well above the quantity estimated to have been released in this event.

Table 3-2. Known Spills During 300 Area Waste Acid Treatment System RCRA Operations by Location. (sheet 5 of 7)

Location	Date	Spill Origination point	Material Spilled	Chemical constituents	Quantity spilled	Description of event	Cleanup action	Comment
313 Building (cont)	11-03-83	Uranium recovery area	Waste etch acids	HNO ₃ , HF, and H ₂ SO ₄ acid containing copper chromium, uranium, and zirconium in solution	Approximately 1 gal of solution	While disconnecting piping at a component cleaning line pump (P-1) for maintenance, solution leaked from pipe into process sewer.	No cleanup action. Bucket was placed under pipe to collect remaining acid solution.	Quantity was apparently well below any CERCLA RQs. A valve was installed to isolate the pump when maintenance is required.
	03-26-84	311 Tank Farm and uranium recovery area	Neutralized waste	NaF, NaNO ₃ , and Na ₂ SO ₄ solution with precipitates of copper, chromium, uranium, and zirconium	Unknown	Weekly 313 process sewer sample for the week of 03-19-84 to 03-26-84 showed elevated level of fluoride (4.8 ppm). This was apparently due to three separate events: <ul style="list-style-type: none"> • A leak at the 313 recovery area neutralized pump • Washdown of 311 catch basin (including crystals from apparent previous spill) into the process sewer • Washdown of acid sump behind 303-F Building in preparation for repair work. 	None.	Based upon a normal average weekly process sewer sample F ⁻ content of 0.7 ppm and using a total stream flow of 311,100 gal, 23 lb of NaF could have been released in this spill. This is well below the CERCLA RQ for this compound of 1,000 lb.
	03-12-87	313 Building - recovery area	Waste etch acids	HNO ₃ , HF, and H ₂ SO ₄ acid containing uranium, copper chromium, and zirconium in solution	3/4 gal	Acid sprayed out of air-actuated inline valve above Tank 2. Approximately 1/4 gal of acid reached process sewer and activated pH monitor alarm. Remaining acid puddled on floor. Appeared that mechanical stops in valve were out of adjustment.	Spill kits were used to clean up floor and walls, then area was scrubbed and washed down. Air valve was repaired, and pressure in system investigated.	--
	08-08-89	313 Building - recovery area	Radioactive contaminated water	--	270 gal	Valve of hot water hose leaked water into radioactively contaminated processing area. Leak filled sump under the process tanks and then containment overflowed into hallway at south end of building.	Water pumped from containment area for processing; mopped up outside containment. Valve was repaired. Contamination survey was performed.	--
311 Tank Farm	07-19-82	311 Tank Farm	Neutralized waste	NaF, NaNO ₃ , Na ₂ Cr ₂ O ₇ , and Na ₂ SO ₄ solution with precipitates of uranium, copper, and zirconium	Unknown (small quantity)	35 lb of oxalic acid were transferred into the outside storage tank, resulting in a chemical reaction which foamed out of the tank and into the process sewer system.	Remaining foam was washed into the process sewer.	Estimate: copper (56 lb), NO ₃ ⁻ (970 lb), fluoride (50 lb), uranium (0.3 lb). Estimated quantity of NaF involved (100 lb) was well below current CERCLA RQ of 1,000 lb.

Table 3-2. Known Spills During 300 Area Waste Acid Treatment System RCRA Operations
by Location. (sheet 6 of 7)

Location	Date	Spill Origination point	Material Spilled	Chemical constituents	Quantity spilled	Description of event	Cleanup action	Comment
311 Tank Farm (cont)	Week ending 02-13-83	311 Tank Farm	Neutralized waste	NaF, NaNO ₃ , Na ₂ Cr ₂ O ₇ , and Na ₂ SO ₄ solution with precipitates of uranium, copper, and zirconium	Unknown	Overflow of storage tank in 311 Tank Farm. Weekly 313 process sewer sample showed elevated levels of fluoride (7 ppm) and nitrate (158 ppm). High-level alarm was out of adjustment.	washed into the process sewer	This weekly process sewer composite normal average fluoride content was 0.3 ppm; the average NO ₃ content was 11.4 ppm. Based upon a total flow of 313,000 gal, the quantity released in this event is estimated to have been 39 lb of NaF and 525 lb of NaNO ₃ . The CERCLA RQ for NaF is 1,000 lb; there is no RQ for NaNO ₃ . Repaired high-level alarm.
	08-24-87	311 Tank Farm - east pipe trench at railroad underpass	Waste etch acids	HNO ₃ , H ₂ SO ₄ , and HF acids containing uranium, copper, and zirconium in solution	Not reported	Acid leak found in trench which damaged two adjacent lines containing ethylene glycol. Leak was contained in trench and railroad underpass.	Pipes were flushed and soda ash was applied to neutralize acid.	Railroad underpass was pumped out and all liquids and solids in trench were disposed of. Piping was repaired. There was no discharge to the process sewer.
	08-08-89	311 Tank Farm - bermed containment area and sump	Waste etch acids	HNO ₃ , H ₂ SO ₄ , and HF acids containing uranium, copper, and zirconium in solution	Not reported	Leak in cemented joint of aging PVC pipe resulted in acidic pH in containment area and sump pump effluent.	205 gal of liquid was pumped from bermed containment area and neutralized in Tank 2. Joint was replaced.	There was no discharge to the process sewer.

Table 3-2. Known Spills During 300 Area Waste Acid Treatment System RCRA Operations
by Location. (sheet 7 of 7)

Location	Date	Spill Origination point	Material Spilled	Chemical constituents	Quantity spilled	Description of event	Cleanup action	Comment
311 Tank Farm (cont)	12-05-89	311 Tank Farm - bermed containment area and sump	Caustic solution; weak etch acids	50% NaOH and HNO ₃ , H ₂ SO ₄ , and HF acids containing uranium, copper, and zirconium in solution	Small quantity	Small leak in joint of acid transfer line dripped onto the steel caustic transfer pipe connected to Tank 2. The acid caused a caustic line underneath to begin leaking, resulting in a high pH in the sump water.	Leak was fully contained. Applicable valves and pumps were locked out and temporary repairs were ordered.	Collected solution and rinse water were added to 300 Area WATS ⁹ in the 313 Building.

a HNO₃ = nitric acid
 c H₂SO₄ = sulfuric acid
 d CrO₃ = chromic acid
 e HF = hydrofluoric acid
 f NO₃ = nitrate ion
 g F = fluoride ion
 h NaOH = sodium hydroxide.
 i ppm = parts per million
 j PVC = Polyvinyl chloride
 k CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act of 1980.
 l RQ = Reportable quantity
 m Cu(NO₃)₂ = cupric nitrate
 n NaNO₃ = sodium nitrate
 o Na₂SO₄ = sodium sulfate
 p NaF = sodium fluoride
 q Na₂Cr₂O₇ = sodium dichromate
 r WATS = Waste Acid Treatment System
 This likely documents a direct discharge to the process sewer and not a spill.

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4.0 WASTE CHARACTERISTICS

This chapter discusses the inventory and the characteristics of the waste stored and treated in the 300 Area WATS tank system.

4.1 ESTIMATE OF MAXIMUM INVENTORY OF WASTE

From the beginning of 300 Area WATS RCRA operations (November 19, 1980) until November 1985, the waste stream consisted of a waste acid slurry that was transported by tanker trailer to the 183-H Basins for volume reduction through solar evaporation. The quantity of slurry transported during this time frame is identified in Table 4-1. In November 1985, the slurry began being separated into solids (sludge) and effluent. The sludge was containerized and sent to the 200 Area for disposal (Table 4-2). The effluent was shipped to the 340-B Building for temporary tank storage until being shipped to the 200 Area DST System or to an offsite TSD if below radioactive release limits (Table 4-3).

The estimated maximum inventory of waste acid treated in the 300 Area WATS from the beginning of RCRA operations in 1980 through 1989, when the unit essentially ceased processing fuel fabrication waste, is 1,203,351.2 kilograms (2,657,300 pounds). This was determined by summing the quantities presented in Tables 4-1, 4-2, and 4-3 of slurry, sludge, and effluent that was collected from the system for disposal. The maximum quantity of waste treated during any one year of this period was 1,574,7426.4 liters (416,000 gallons) (Table 4-1).

4.2 WASTE CHARACTERISTICS

The 300 Area WATS routinely managed waste originating from fuel fabrication process tanks located in the 333 Building. The chemical and radioactive constituents from each of these tanks are shown in the primary chemical output column and in the footnotes of Table 3-1. Although waste designation was not performed on these wastes prior to disposal to the system, upon entry into the system some waste would have exhibited dangerous waste characteristics of ignitability (D001), corrosivity (D002), and Washington State toxicity (WT02), and toxicity due to chromium (D007). No 'listed' waste (in accordance with WAC 173-303-081 and WAC 173-303-082) existed or was managed in any portion of the 300 Area WATS since the effective date of RCRA dangerous waste management operations (November 19, 1980).

Until 1988, the 300 Area WATS also treated corrosive dangerous or mixed waste from other locations in the 300 Area and across the Hanford Site on a nonroutine basis. Table 4-4 summarizes information from CWDPs showing these additions to the 300 Area WATS from 1980 to 1988. Although waste designation was not performed on these wastes prior to disposal to the system, upon entry into the system some waste would have exhibited dangerous waste characteristics of ignitability (D001), corrosivity (D002), and EP toxicity due to arsenic (D004), barium (D005), cadmium (D006), and lead (D008).

1 The neutralized effluent stored in Tanks 40 and 50 sometimes remained
2 corrosive (D002) dangerous waste because of the over addition of NaOH during
3 waste acid neutralization. In the past, such waste also may have retained its
4 toxicity characteristics from the heavy metals. However, recent waste
5 designation, which is based on sampling of this effluent, has indicated that,
6 although remaining radioactive, it is nondangerous.
7

8 Table 4-5 is a list of all of the chemical constituents from the
9 333 Building operations and from nonroutine chemical additions that were
10 managed in the 300 Area WATS. Many of these constituents were not added to
11 the system above dangerous waste designation levels.

Table 4-1. 300 Area Waste Acid Treatment System (RCRA) Slurry Shipped to 183-H Basins 1980 to 1985.

3 4	Year	Total gallons	Number of loads	Pounds of material							
				Uranium	Chromium	Manganese	Copper	Fluoride ion	Nitrate ion	Sulfate ion	Ammonium ion
5	1980	151,000	60	410	200	300	33,200	10,800	151,800	59,900	130
6	1981	200,000	75	520	150	340	38,200	12,700	252,700	50,800	260
7	1982	247,000	112	470	130	420	44,600	17,700	309,400	58,000	290
8	1983	406,000	184	630	120	380	72,600	22,700	451,300	122,300	760
9	1984	416,000	185	600	90	300	57,000	32,700	431,700	141,200	660
10	1985	369,000	163	440	90	200	49,000	27,000	550,000	97,000	520
11	Total	1,789,000 ^a	779	3,070	780	1,940	294,600	123,600	2,146,900	529,200	2,620

^a Weighted average pH was 9.8.

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Table 4-2. 300 Area Waste Acid Treatment System Sludge Shipped to the 200 Area.*

Year	Total pounds	Number of drums	Pounds of material				
			Uranium	Chromium	Copper	Fluoride ion	Nitrate ion
1985	44,912	198	97	13	9,857	3,029	3,100
1986	298,720	633	775	104	32,346	22543	33,275
1987	46,977	98	178	3	4,801	2,050	5,525
1988	534	2	1	14	70	3	3
1989	3,620	7	31	3	533	35	232
TOTAL	394,763	938	1,082	137	47,607	27,660	42,135

*Sludge from centrifuge. Sulfate ion shown on Tables 4-1 and 4-3 but not on this table was from the uranium recovery system waste that was not processed through the centrifuge.

T4-2
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Table 4-3. 300 Area Waste Acid Treatment System Effluent Shipped to the 340-B Building and Offsite.

Year	Total pounds	Number of drums	Pounds of material					
			Uranium	Chromium	Copper	Fluoride ion	Nitrate ion	Sulfate ion
A: Shipped to the 340-B Building								
1985	46,250	20	1	1	2	7,013	39,677	17,001
1986	327,588	125	10	15	10	5,742	300,035	92,185
1987	51,165	19	2	1	1	628	33,060	9,038
1988	5,500	3	1	1	<1	99	2,904	110
1995	31,545	NA	<1	<1	<1	95	449	1,214
Total	462,048 ^a	167	14	18	13	13,577	376,128	119,548
B: Shipped offsite								
1989	11,414 ^b	3	2	2	<1	317	9,039	468

^aWeighted average pH was 13.18.

^bWeighted average pH was 12.63.

Table 4-4. Nonroutine Wastes Managed in the RCRA 300 Area Waste
Acid Treatment System. (sheet 1 of 7)

Waste disposal permit number	Permit date	Material description	Quantity (gal) (lb)	Summary of lab results
1-80	2/01/80	Used sulfuric acid from start-up tests of acid digestion system	935	230 g/L sulfuric acid, 30 ppm ^a barium 30 ppm chromium 300 ppm copper 30 ppm manganese 5 ppm molybdenum 3,000 ppm sodium 60 ppm nickel 1 ppm vanadium 300 ppm zinc 500 ppm aluminum 300 ppm calcium 300 ppm iron
4-80	10/02/80	Used glycol/sodium metasili- cate-based proprietary silk screen cleaning solution	100	pH = 12.1 90-100 ppm barium 10 ppm cadmium 30 ppm copper 500-1,100 ppm potassium 16,000- 21,000 ppm sodium 40-60 ppm lead 40 ppm zinc 5-10 ppm boron
1-81	2/12/81	Used copper strip solution containing depleted uranium	300	2.63 lb/gal nitric acid 1.46 lb/gal copper 0.022 lb/gal uranium 30 ppm chromium 6 ppm manganese 10 ppm nickel 40 ppm zinc 200 ppm aluminum 150 ppm calcium
3-81	12/03/81	Unused chemicals: Nickel acetate solution	0.25	pH = 3.24 13 ppm arsenic 1 ppm zinc 1 ppm nickel 20 ppm aluminum

Table 4-4. Wastes Not from the 333 Building Added to the
300 Area Waste Acid Treatment System. (sheet 2 of 7)

Waste disposal permit number	Permit date	Material description	Quantity (gal) (lb)		Summary of lab results
3-81 (continued)		Proprietary chemical 1	1.5		pH = 7.79 90 ppm chromium 570 ppm sodium 1 ppm antimony
		Proprietary chemical 2	0.75		pH = 7.45 350 ppm sodium
		Nickel sulfate solution	1		pH = 5.34 1,530 ppm nickel 1 ppm arsenic 1 ppm cobalt 1 ppm chromium
		Proprietary chemical 3	0.75		pH = 8.43 25 ppm cobalt 150 ppm sodium
		Proprietary chemical 4	0.75		pH = 8.92 80 ppm chromium 1 ppm antimony 360 ppm sodium
1-82	1/05/82	Used copper strip solution containing depleted uranium	300		<0.1 lb/gal nitric acid 1.31 lb/gal copper 0.152 lb/gal uranium 6 ppm cobalt 28 ppm nickel 100 ppm zinc 20 ppm titanium
2-82	1/05/82	Used glycol/sodium metasili- cate-based proprietary silk screen cleaner	50		pH = 11.78 28 ppm barium 140 ppm copper 4,100 ppm sodium 26 ppm lead 3 ppm zinc 1 ppm chromium 5 ppm titanium 12 ppm phosphorus

Table 4-4. Wastes Not from the 333 Building Added to the
300 Area Waste Acid Treatment System. (sheet 3 of 7)

Waste disposal permit number	Permit date	Material description	Quantity (gal) (lb)		Summary of lab results
3-82	7/09/82	Unused chemicals: Oxalic acid		35	None
		Proprietary chemical	55		pH = 13.7 18 ppm copper 3,800 ppm silicon 13 ppm zinc
		Solution in unmarked container	5		pH = 13.3 6 ppm copper
4-82	11/05/82	Used nitric acid solution containing uranium	13		0.32 lb/gal nitric acid 607 ppm uranium
1-83	1/17/83	Used absorbing solution containing mercuric chloride (100 g/L = 9.8 lb)	12		None
2-83	4/22/83	Used glycol/sodium metasilicate-based proprietary silk screen cleaning solution (two drums):			
		Drum 1	30		pH = 10.7 2 ppm barium 630 ppm sodium
		Drum 2	30		pH = 12.8 20 ppm barium 2 ppm molybdenum 1,400 ppm sodium 260 ppm lead 2 ppm strontium
3-83	4/25/83	Used copper strip solution containing depleted uranium	400		1.07 lb/gal nitric acid 1.52 lb/gal copper 0.816 lb/gal uranium 280 ppm zinc 790 ppm titanium 30 ppm nickel 170 ppm iron 470 ppm calcium

Table 4-4. Wastes Not from the 333 Building Added to the
300 Area Waste Acid Treatment System. (sheet 4 of 7)

Waste disposal permit number	Permit date	Material description	Quantity (gal) (lb)	Summary of lab results
4-83	7/11/83	Used copper strip solution containing depleted uranium	550	3.0 lb/gal nitric acid* 1.5 lb/gal copper 0.3 lb/gal uranium 324 ppm zinc 30 ppm nickel 270 ppm titanium 98 ppm lead 1,178 ppm magnesium 230 ppm calcium
1-84	4/18/84	Used glycol/sodium metasilicate-based proprietary silk screen cleaning solution (three drums):		
		Drum 1	30	pH = 12.9 45 ppm barium 12 ppm chromium 10,900 ppm sodium 110 ppm lead 2,200 ppm silicon 2.7 ppm strontium
		Drum 2	30	pH = 11.9 1.1 ppm chromium 670 ppm sodium 370 ppm phosphorus 340 ppm silicon 1160 ppm potassium
		Drum 3	30	pH = 12.2 42 ppm barium 6 ppm chromium 1 ppm copper 10,600 ppm sodium 50 ppm lead 1 ppm strontium 2,480 ppm silicon 2 ppm zinc 20 ppm phosphorus

Table 4-4. Wastes Not from the 333 Building Added to the
300 Area Waste Acid Treatment System. (sheet 5 of 7)

Waste disposal permit number	Permit date	Material description	Quantity (gal) (lb)		Summary of lab results
2-84	5/3/84	Used copper strip solution containing depleted uranium	225		0.19 lb/gal nitric acid 1.80 lb/gal copper 0.44 lb/gal uranium 336 ppm lead 588 ppm zinc 212 ppm titanium 374 ppm chromium 3,820 ppm gadolinium 1,120 ppm phosphorus
1-85	4/12/85	Used copper strip solution containing depleted uranium	200		0.07 lb/gal nitric acid 1.60 lb/gal copper 0.394 lb/gal uranium 1,400 ppm aluminum 60 ppm cobalt 1,600 ppm sodium 2,000 ppm magnesium 600 ppm phosphorus 700 ppm silicon 300 ppm zinc 150 ppm titanium
2-85	5/10/85	Used phosphoric/citric- acid-based proprietary cleaning solution	80		pH = 1.0 0.38 lb/gal phosphoric acid 1,400 ppm citrate 30 ppm sodium
3-85	5/21/85	Residual 36% sulfuric acid in 20 drums	Unknown (residue in "empty" drums)		None
4-85	10/16/85	Used copper strip solution contain- ing depleted uranium	200		0.032 lb/gal nitric acid 1.19 lb/gal copper 0.249 lb/gal uranium 1,200 ppm magnesium 90 ppm titanium
1-86	1/09/86	Uranium-bearing nitric Acid solution from the 325 Building used in chop leach testing	8.4		1.74 lb/gal nitric acid 0.91 lb/gal uranium 80 ppm aluminum 40 ppm iron

Table 4-4. Wastes Not from the 333 Building Added to the
300 Area Waste Acid Treatment System. (sheet 6 of 7)

Waste disposal permit number	Permit date	Material description	Quantity (gal) (lb)		Summary of lab results
2-86	8/15/86	Used copper strip solution containing depleted uranium	250		0.097 lb/gal nitric acid 1.8 lb/gal copper 0.31 lb/gal uranium
1-87	4/18/87	Used copper strip solution containing depleted uranium	200		0.033 lb/gal nitric acid 1.68 lb/gal copper 0.28 lb/gal uranium 230 ppm titanium
2-87	5/06/87	Nitric acid solution from analyzing weir box sludge	31		4.00 lb/gal nitric acid 1.22 lb uranium 0.11 lb copper 0.12 lb magnesium 0.09 lb manganese 0.08 lb nickel 0.30 lb aluminum 1.01 lb calcium 0.68 lb iron
3-87	10/06/87	Solutions in Tank 15 and 19 that had been used for testing zirconium removal and hydrofluoric acid rejuvenation	110		None
1-88	2/26/88	Used copper strip solutions containing depleted uranium	150		0.021 lb/gal nitric acid 1.69 lb/gal copper 0.293 lb/gal uranium 100 ppm titanium 20 ppm iron
N/A	1/75 to 11/86	Solutions from decontaminating autoclaves after a fuel element failure:			None
		Decon solution makeup:	1,440		
		Sodium hydroxide		1,248	
		Potassium permanganate		208	
		Final cleaner makeup:	1,350		
		Ammonium citrate dibasic		195	
		Ethylenediaminetetraacetic acid		12	

Table 4-4. Wastes Not from the 333 Building Added to the
300 Area Waste Acid Treatment System. (sheet 7 of 7)

Waste disposal permit number	Permit date	Material description	Quantity (gal) (lb)		Summary of lab results
N/A	1/75 to 1/86	X-ray film chemicals:			None
		Developer chemicals:	2,336		
		Sodium sulfite		2,797	
		Hydroquinone		934	
		Potassium/sodium hydroxide		374	
		Sodium carbonate		374	
		Diethylene glycol		374	
		Acetic acid		449	
		1-phenyl-3-pyrazolidone		66	
		Glutaraldehyde		772	
		Fixer chemicals:	6,811		
		Ammonium thiosulfate		9,184	
		Sodium bisulfite		576	
		Acetic acid		751	
		Aluminum sulfate		250	
		Gluconic acid		250	
		System cleaners:	3,438		
		Sodium dichromate		139	
		Sulfuric acid		139	
		Roller cleaner:	1,017		
		Sulfamic acid		67	
		Potassium dichromate		40	

^appm = parts per million

Table 4-5. Chemical Waste Constituents Managed in the 300 Area WATS.

Metals:	Organic Materials:
Aluminum	Acetate ion
Antimony	Citrate ion
Arsenic	Choline chloride
Barium	Deoxycholic acid
Beryllium	Diethanolamine
Boron	Diethylene glycol
Cadmium	Ethylenediamine
Calcium	Ethylenediamine-
Cerium	Tetraacetic acid
Chromium	Gluconic acid
Cobalt	Glutaraldehyde
Copper	Hydroquinone
Gadolinium	Mercaptoacetic acid
Iron	Oxalate ion
Lead	1-phenyl-3-pyra zolidone
Lithium	Rhodamine-B
Magnesium	Trichloroacetic acid
Manganese	Urea
Mercury	
Molybdenum	
Nickel	
Phosphorus	
Potassium	
Silicon	
Silver	
Sodium	
Strontium	
Titanium	
Uranium	
Vanadium	
Zinc	
Zirconium	

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5.1	GROUNDWATER MONITORING, REMEDIATION, AND SOIL CLEANUP LEVELS	5-1

FIGURE

5-1	300-FF-5 Operable Unit	T5-1
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5.0 GROUNDWATER

This chapter identifies that groundwater monitoring and remediation are not a requirement of 300 Area WATS closure and discusses soil cleanup levels that will be protective of groundwater.

5.1 GROUNDWATER MONITORING, REMEDIATION, AND SOIL CLEANUP LEVELS

The 300 Area WATS is not a regulated unit under the definitions of WAC 173-303-040 (i.e., surface impoundment, waste pile, land treatment unit, landfill) and, therefore, a groundwater monitoring program in accordance with WAC 173-303-645 is not required.

In accordance with the Tri-Party Agreement (Ecology et al. 1989), all groundwater in the 300 Area has been included in the 300-FF-5 (groundwater) OU and is being investigated under the CERCLA RI/FS process for this OU. The 300-FF-5 OU consists of the aquifers beneath the 300-FF-1 and 300-FF-2 OU and is bounded by the Columbia River on the east (Figure 5-1). The OU is defined by the "observed and assumed extent of uranium contamination in the groundwater" and ultimately will include all contamination exceeding applicable or relevant and appropriate requirements emanating from the two OUs, and detected in ground and sediment below the water table (DOE/RL 1989). Consequently, any possible groundwater remediation resulting from the 300-FF-5 CERCLA OU investigation will be performed as part of the CERCLA groundwater remedial action and not the 300 Area WATS Closure.

The 300 Area WATS is a tank system with functioning secondary containment and as such may have only minimally affected soils and has not affected groundwater. The 300-FF-5 RI/FS process has identified the land-based disposal units (e.g., sewers, ponds, trenches) as the only sources of 300 Area groundwater contamination (DOE/RL 1993). The 300-FF-5 OU RI/FS process also has identified the dangerous contaminants of concern to 300 Area groundwater as dichloroethene, trichloroethene, and nickel (DOE/RL 1994). These constituents either were not managed at the 300 Area WATS (i.e. dichloroethene and trichloroethene) or were managed at the unit but remained contained (i.e. nickel, Table 3-2). Because 300 Area WATS constituents are not present in groundwater, no pathway exists. Therefore, soil cleanup (if necessary) to MTCA (WAC 173-340-740) Method B formulas would be sufficiently protective of groundwater.

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Figure 5-1. 300-FF-5 Operable Unit.

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6.0 CLOSURE STRATEGY AND PERFORMANCE STANDARDS

This chapter describes the closure strategy, closure performance standards, and the steps that will be taken to close the 300 Area WATS.

6.1 CLOSURE STRATEGY

The 300 Area WATS will be clean closed with respect to dangerous waste contamination resulting from operations of the unit as a RCRA TSD. Clean closure of the facilities will be accomplished by removing or decontaminating all contaminated tank system components, equipment, and structures to clean closure standards. Clean closure of soils primarily will be accomplished by demonstrating that the 300 Area WATS secondary containment system kept contaminants from RCRA operations from reaching soils. As described below, remedial action with respect to contamination that was not a result of 300 Area WATS operations, or was associated with the 300 Area WATS, but is not covered under this closure plan, will be deferred to the CERCLA remedial action process for the 300-FF-2 OU.

Closure of the various 300 Area WATS locations will occur over time in three phases. This approach is intended to allow the closure of individual locations to proceed toward completion in a timely manner while most efficiently utilizing existing 300 Area personnel.

Clean closure, in accordance with WAC 173-303-610 (2)(b)(ii), requires that contaminated 300 Area WATS components, equipment, and structures be removed or decontaminated to standards that are protective of human health and the environment and that such standards be determined by Ecology on a case-by-case basis. This closure plan proposes use of a 'clean debris surface,' as defined in Chapter 7.0, as the decontamination standard for materials that will remain at the unit after closure and must meet clean closure standards. Use of this standard ensures that such materials would not be dangerous waste when eventually disposed of. This approach is consistent with Ecology guidance provided in *Guidance for Clean Closure of Dangerous Waste Facilities* (Ecology 1994) for achievement of tank system clean closure. Additionally, adherence to this standard ensures that all residues have been removed from the unit as required by WAC 173-303-640 for clean closure of tank systems.

Material that is identified to be removed during closure will undergo waste pre-determination (before removal) or waste designation (after removal) in accordance with WAC 173-303-070. Where waste pre-determination identifies that the material would designate as hazardous debris upon removal, the debris may be decontaminated (in-place) prior to removal. When removed, the material would undergo final waste designation and be disposed of as low-level or nonregulated waste. Alternately, the debris may be removed and then treated as hazardous debris to a 'clean debris surface' at the unit to allow its disposal as low-level or nonregulated waste or may be removed and transported to T Plant Complex for treatment. Treatment at the unit will require use of

an appropriate physical extraction method from Table 1, Alternative treatment Standard for Hazardous Debris (40 CFR 268.45).

The 'clean debris surface' standard is visually verifiable. Inspections to verify achievement of a clean debris surface will be performed and documented in accordance with an Ecology approved inspection plan, developed as described in Chapter 7.0.

Visual inspections also will be used to assist with determining if sampling of 300 Area WATS soils will be necessary to support clean closure of unit soils. The 300 Area WATS has always had a functioning secondary containment system (i.e., concrete containment basins, bermed concrete floors and pads) to collect leaks or spills or to channel them to drains or sumps, thereby preventing spills from reaching soils. Consequently, soils could only be contaminated where the secondary containment had failed. To determine if containment failure has occurred, concrete containment surfaces will be inspected for cracks that (if existing) could have provided a pathway to soil for contamination from RCRA operations. If such cracks are not identified, the soils will be clean closed. However, if such cracks are identified, the concrete would be cored at the cracks and the soils beneath sampled in accordance with an Ecology approved sampling plan as described in Chapter 7.0. To verify the appropriate RCRA closure level for soils, the soil sample results would be evaluated and contaminant concentrations compared to clean or 'modified' closure 'action levels' as identified below.

Action levels are concentrations of dangerous waste analytes prompting an action (e.g., decontamination, removal, or further evaluation) in support of closure of soils. Analyte concentrations are determined through analytical sampling. Action levels pertain to closure of 300 Area WATS soils and not contaminated equipment or structures that will be visually verified. Initial action levels for underlying soils will be natural background thresholds as defined in *Hanford Site Background: Part 1 Soil Background for Nonradioactive Analytes* (DOE-RL 1992b) or limit of quantitation (LOQ). If sampling and analysis is performed and shows concentrations above these levels, closure to health-based levels (HBL) will be assessed. The HBLs are calculated using chemical-specific variables for toxicity and carcinogenicity provided in U.S. Environmental Protection Agency's (EPA) Integrated Risk Information System (IRIS) database (Ecology et al. 1994b) that relates human health to action levels. The IRIS values are updated periodically and are used in the MTCA (WAC 173-340) formulas. The MTCA clean closure HBLs for soils are identified in WAC 173-303-610 (2)(b)(i) as numeric cleanup values calculated according to MTCA Method B, or Method A where appropriate. The HBLs will be based on the IRIS values current at the time of closure plan approval.

If soil sampling is performed and results indicate that clean closure of unit soils is not achievable, then modified closure of the unit as an industrial site in accordance with Section II.K.3 of the *Hanford Facility RCRA Permit* (RCRA Permit) (Ecology et al. 1994b) will be initiated. Modified closure would require postclosure institutional controls and periodic assessments that would be specified in a RCRA postclosure permit application and in Chapter 8.0 of this plan, if needed. Although not expected, if such sampling identified an imminent threat to human health or the environment, an

1 expedited response in accordance with the Tri-Party Agreement Action Plan,
2 Chapter 6 (Ecology et al. 1994a), will be initiated.

3
4 Soil remediation will not be performed as a portion of 300 Area WATS
5 closure activities. In accordance with the Tri-Party Agreement Action Plan
6 (Ecology et al. 1994a), remediation of soil contamination will be deferred to
7 the CERCLA RI/FS process for the 300-FF-2 OU.

8
9 Investigation of documented past practices soil contamination located
10 beneath the 334-A (Section 3.2.2) and 313 Buildings (Section 3.2.4) will be
11 addressed by the 300-FF-2 CERCLA OU. Investigation of the concrete pipe
12 trench that passes through and between the buildings (Figure 2-3) also will be
13 deferred to the CERCLA remedial action process for the 300-FF-2 OU. This
14 trench is a contiguous infrastructure that long predates RCRA operations. It
15 houses other systems' piping, including Uranium-Bearing System piping that,
16 for many years prior to RCRA, transported similar waste that contaminated the
17 trench with similar waste constituents.

18
19 The flowchart in Figure 6-1 shows the strategy for closure of
20 300 Area WATS materials and soils.

21 22 23 6.2 CLOSURE PERFORMANCE STANDARDS

24
25 This section describes the performance standards to be applied to the
26 closure of 300 Area WATS. This plan has been developed to close the
27 300 Area WATS in a manner that meets the closure requirements of
28 WAC 173-303-640 for tank systems and that meets the following closure
29 performance standards of WAC 173-303-610 (2)(a):

- 30
31 • Minimize the need for future site maintenance
- 32
33 • Control, minimize, or eliminate to the extent necessary to protect
34 human health and the environment, postclosure escape of dangerous
35 waste, dangerous waste constituents, leachate, contaminated run-off,
36 or dangerous waste decomposition products to the ground, surface
37 water, groundwater, or the atmosphere
- 38
39 • Return the land to the appearance and use of surrounding land areas
40 to the degree possible given the nature of the previous dangerous
41 waste activities.

42
43 Clean closure, as provided for in this plan, will eliminate future
44 maintenance and be protective of human health and the environment by removing
45 or reducing chemical contamination at the 300 Area WATS to levels that
46 eliminate the threat of contaminant escape to the environment.

47
48 During closure, steps will be taken to ensure minimal public or worker
49 exposure to dangerous waste constituents. The entire 300 Area is an
50 administratively controlled access area and is expected to remain so for the
51 foreseeable future. Physical and administrative controls will remain during
52 closure to restrict public access, to limit worker access only to trained

1 personnel required to support closure, and to minimize personnel entries into
2 any unclosed areas.

3
4 Reasonable steps will be taken to minimize waste generated during closure
5 by decontaminating, reusing, or recycling material. Where cost effective,
6 waste will be decontaminated prior to disposal to facilitate its disposal as
7 low-level or nonregulated waste. Where practicable and to reduce the
8 potential for onsite worker exposures and to minimize and better control
9 decontamination waste, hazardous debris (primarily components) will be removed
10 to T Plant Complex, a Hanford Site RCRA permitted TSD unit, for treatment.

11
12 At the end of the closure period, the 300 Area WATS will be restored in a
13 manner that is consistent with future use of remaining facilities and with
14 comprehensive land use planning for the 300 Area.

15 16 17 6.3 GENERAL CLOSURE ACTIVITIES

18
19 Closure of the 300 Area WATS will be performed in accordance with the
20 Ecology approved closure plan. However, with Ecology notification and
21 concurrence, closure activities may proceed before closure plan approval.
22 The following general closure activities apply to the various areas of the
23 300 Area WATS and are discussed in greater detail in Chapter 7.0:

- 24
25 • Waste inventory removal will be completed by removing the centrifuge
26 collection barrel and sludge from Tank 40.
- 27
28 • Accessible surfaces of materials, components and structures that
29 will remain after closure, will be visually inspected for a 'clean
30 debris surface' based on process knowledge and history of spills.
31 Inspection results will be documented and used to identify materials
32 that may already meet the clean closure standard and the materials
33 requiring decontamination to meet the standard.
- 34
35 • A waste pre-determination will be performed on the material that
36 will be removed as debris during closure to identify debris that
37 would require decontamination or treatment to allow its disposal as
38 low-level or nonregulated waste.
- 39
40 • Tank system components and secondary containment requiring
41 decontamination will be inspected for cracks or other openings that
42 could allow the escape of decontamination solutions. The affected
43 areas will be mapped and the cracks will be sealed.
- 44
45 • Components and structures at the various 300 Area WATS locations
46 will be removed or decontaminated (as necessary) based on site-
47 specific considerations such as ease of component removal,
48 scheduling (e.g., facilitating demolition), access to other surfaces
49 requiring decontamination, and future use of the material
50 (e.g., scrap metal, reuse, or disposal).
- 51
52 - Metal debris that is free of radioactivity could be removed and
53 managed as recyclable scrap metal under the scrap metal
54 exclusions of WAC 173-303-120 (2)(a)(iv). However, metal

debris that can be disposed of as low-level waste, generally will not undergo radiological decontamination solely to allow recycling.

- Reusable equipment (if any) will be removed, decontaminated to levels that will prevent dangerous waste releases to the environment in accordance with DOE-Richland Operations Office (RL) guidance, and transported to the Hanford Site organization that will reuse the equipment.

- Tanks, equipment, concrete containment, and structures that will remain in-place after closure will be decontaminated (where necessary) to a 'clean debris surface' as the appropriate clean closure standard for tank systems and concrete containment surfaces (Ecology 1994).

- Debris that will be removed for disposal and that would designate as hazardous debris upon removal, may be decontaminated in-place before removal or may be removed and treated at the unit to a clean debris surface to allow its disposal as low-level or nonregulated waste. Alternately, these materials could be removed and transported to T Plant Complex for treatment.

- Decontaminated materials that will remain in-place after closure and materials treated at the unit as hazardous debris will be visually inspected to verify achievement of a clean debris surface and inspection results will be documented as described in Chapter 7.0.

- Nonregulated debris may be recycled, reused, or land disposed in a solid waste landfill without further control under state dangerous waste regulations.

- Concrete containment surfaces will be inspected (as necessary) for through-thickness cracks (i.e., to soil). Soils beneath such cracks (if any) will be sampled and contaminant concentrations evaluated and soils closed as described in Section 6.1.

- Decontamination and/or treatment residues and solutions will be collected, designated in accordance with WAC 173-303-070, and disposed of as described in Section 7.4.4.

Equipment or materials used in performing closure activities will be decontaminated or disposed of at a RCRA-compliant facility.

Closure activities will be monitored by an independent, registered professional engineer (PE). The PE will certify that closure activities were performed in accordance with the Ecology approved closure plan. A copy of this certification will be provided to Ecology by registered mail or other appropriate delivery service.

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Figure 6-1. Closure Strategy Flowchart for the 300 Area Waste Acid Treatment System. (Sheet 1 of 2)

Notes:

- ¹Materials that will remain after closure and must meet clean closure performance standards.
- ²The clean closure performance standard for these materials is 'clean debris surface.'
- ³While material is still in-place at the unit (before it becomes debris), it may be decontaminated to a 'clean debris surface' using other than treatment methods from Table 1, Alternative Treatment Standards for Hazardous Debris, 40 CFR 238.45. Treatment of hazardous debris surfaces will use appropriate treatment technology from Table 1, Alternative Treatment Standards for Debris 40 CFR 268.45. The TSD unit debris does not contain listed waste.
- ⁴Assumption: All dangerous waste will be mixed waste because dangerous waste will not occur without the presence of radionuclides.
- ⁵Assumption: Waste specific treatment per Treatment Standards for Hazardous Waste (40 CFR 268.40) will remove characteristic or criteria from the waste, but not radionuclides.
- ⁶Analytical verification sampling is not necessary; the 'clean debris surface' performance standard is visually verifiable.
- ⁷Application of 'debris rule' treatment and performance standards to nondebris material that will remain at the unit after closure will exit this material from RCRA Subtitle C regulation in accordance with Ecology guidance (Ecology 1994).
- ⁸Assumption: Additional remediation will be possible and desirable where performance standards are not initially met.
- ⁹Imminent hazard in accordance with Tri-Party Agreement Action Plan, Section 6.4 (Ecology et al. 1994a).
- ¹⁰Materials that will be removed at closure for reuse, recycling, or disposal, as appropriate.
- ¹¹Hazardous debris determination is based on the results of a waste 'predetermination' for materials still in-place in the system or a waste designation for materials removed from the system.

Background = Hanford Sitewide background threshold (upper limit range of concentrations) for soil (DOE-RL 1992b).

CERCLA = Comprehensive Environmental Response Compensation, and Liability Act of 1980.

Clean Closure = Closure of environmental media (e.g. soils) based on the criterion that dangerous waste is not present in concentrations above MTCA B residential health-based clean closure performance standards of WAC 173-303-610 (2)(b)(i).

CWC = Central Waste Complex

Debris = Solid hazardous material greater than 6.35 centimeters (2.5 inches) particle size, intended for disposal that has been generated as waste.

DW = Dangerous waste as defined in WAC 173-303.

LLBG = Low-Level Burial Ground

LLW = Low-Level Waste

LOQ = Limit of quantitation; the level above which quantitative analysis can be obtained with a specified degree of confidence; generally 10 $\pm$ 3 σ .

Modified Closure = Closure based on the criterion that dangerous waste concentrations are greater than MTCA B residential cleanup levels, but less than, or equal to, MTCA C industrial cleanup levels; nonclosure monitoring is required.

MTCA = Model Toxics Control Act (WAC 173-304) residential and industrial formulas.

MW = Mixed Waste

RCRA = Resource Conservation and Recovery Act of 1976.

TSD = Treatment, Storage, and/or Disposal

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7.0 CLOSURE ACTIVITIES

This chapter discusses the activities necessary to implement the phased clean closure strategy for the 300 Area WATS as described in Chapter 6.0.

7.1 INTRODUCTION

Closure of the various 300 Area WATS locations will occur in three phases (Phase 1, 2 and 3). The following sections identify the 300 Area WATS closure activities in the order in which they will occur. Phase 1 of closure is anticipated to begin in the spring of 1996 and will address closure of the 313 Building. Phase 2 of closure will address closure of the 334-A Building, the 333 Building, and the 303-F Building. Phase 3 of closure will address the 334 Tank Farm, the 311 Tank Farm, and piping in the pipe trenches. The activities necessary to implement closure of each 300 Area WATS location will include some or all of the following closure activities:

- Removal of dangerous waste inventory (where remaining)
- Unit inspections
- Removal and decontamination of recyclable metal or reusable equipment (where appropriate)
- Decontamination or treatment (as appropriate) at the unit of debris removed for closure, or, debris removal to T Plant Complex
- Decontamination of components and structures that will remain after closure to a 'clean debris surface'
- Concrete coring and characterization soil sampling (if necessary)
- Decontamination/treatment verification inspections
- Certification of closure.

7.2 REMOVAL OF DANGEROUS WASTE INVENTORY

The 300 Area WATS performed only tank treatment and storage of dangerous and mixed waste. The inventory of tank system effluent has been removed from the system and it is now dry. The last remaining effluent waste was removed from Tank 50 of the 311 Tank Farm on July 25, 1995 (Table 4-3) in a manner consistent with previous waste removals described in Chapter 3.0. The effluent was pumped to a tank trailer and transported to the 340-B Building for shipment to the DST system in the 200 Area for long-term storage.

Sludge remains in the centrifuge solids collection drum (a 208.2-liter [55-gallon] drum) located in the 313 Building and in Tank 40 located in the 311 Tank Farm. The centrifuge solids collection drum will be removed from the

unit and the contents will be designated as mixed waste and repackaged (as necessary) for transport to the Central Waste Complex for storage. The sludge remaining at the bottom of Tank 40 will be inspected to determine its consistency and will be shoveled or otherwise placed into containers most likely located inside the tank. The workers placing the sludge into the containers may be located inside of Tank 40 or the activity may be performed remotely based on as low as reasonably achievable (ALARA) considerations.

Removal of waste residues remaining in other portions of the system will occur as described in this chapter.

7.3 INITIAL VISUAL INSPECTIONS

This section describes the procedures for performing and documenting initial visual inspection of unit materials that will remain at the unit after closure and must meet clean closure performance standards. Initial inspections also will include waste pre-determination or waste designation for materials that will be removed at closure for disposal.

7.3.1 Inspection of Material That Will Remain After Closure

Where accessible, tank system components, concrete secondary containment, and building structures will be visually inspected concurrently and radiologically surveyed while still in-place in the system and before decontamination. The inspections will determine which of the materials that will remain after closure already meet the clean closure standard of a 'clean debris surface' and the materials requiring decontamination to meet the standard. A *"clean debris surface means the surface, that when viewed without magnification, shall be free of all visible contaminated soil and hazardous waste, except that residual staining from soil and waste consisting of light shadows, slight streaks, or minor discoloration, and soil and waste in cracks, crevices and pits shall be limited to no more than 5% of each square inch of surface area"* (40 CFR 268.45).

Except for the 334 Tank Farm, inspection of concrete secondary containment surfaces for a 'clean debris surface' will occur after concrete decontamination. This is because a 'clean debris surface' cannot be achieved for contaminated concrete without removal of .6 centimeter (1/4 inch) of the surface layer.

Materials removed from the system as hazardous debris, then treated at the unit to remove the waste characteristic, must meet the treatment standard of a 'clean debris surface' to allow its disposal as low-level or nonregulated waste.

Inspection of materials for a 'clean debris surface' will be documented on a checklist similar to Figure 7-1, "Waste and Residue Removal Checklist (WRRCL) for the 300 Area WATS." This checklist also will be used to document decontamination and will be implemented in accordance with an Ecology-approved.

1 inspections plan developed as described in Section 7.4. Those materials
2 already meeting the standard can be clean closed as-is based on Ecology
3 acceptance of the completed WRRC.

4
5 For areas and components identified as requiring decontamination in-place
6 using liquid decontamination solutions, this inspection will be used to locate
7 cracks or openings needing repair before decontamination in order to preclude
8 the escape of solutions.

11 7.3.2 Waste Designation

12
13 Materials that will be removed from the unit as debris must undergo waste
14 designation in accordance with WAC 173-303-070 prior to disposal. This
15 designation will be performed by a waste designator who is trained and uses
16 methods in accordance with an Ecology approved inspection plan. The
17 designation is intended to identify the debris that would be hazardous debris
18 upon removal from the system and, therefore, would require decontamination
19 (in-place) or treatment (after removal from the system) to allow its disposal
20 as low-level or nonregulated waste. The designation will be a waste
21 'pre-determination' if performed before the materials are removal from the
22 system.

23
24 The designation will be a process knowledge designation that will be
25 based on inspection results, waste characteristics information, and the
26 results of Tank 2 sampling (already performed and shown in Appendix 7C).
27 Tank 2 sampling results have identified the concentration of Table 7-1
28 contaminants of concern in residues that exist in components of the
29 313 Building. These results represent a 'worst case' contamination potential
30 for 300 Area WATS residues. This is because the residues in this portion of
31 the system would contain all waste metal constituents of concern to the unit
32 in concentrated precipitate form, plus sodium and hydroxide ions from the
33 sodium hydroxide (NaOH) used to neutralize the waste acid in Tank 2.

34
35 Waste designation may be performed by direct viewing or, if limited by
36 accessibility, by indirect viewing such as by use of a baroscope. A maximum
37 quantity of residues on the debris surface will be calculated from
38 measurements of the affected debris surface area and residue depth. A maximum
39 quantity of residues on the debris surface could be visually estimated by
40 comparing the quantity of residues to a readily recognizable, predetermined
41 standard (e.g., teaspoon). The maximum quantity of residue on the debris
42 would then be compared to the quantity of residues that would cause the entire
43 waste matrix to designate as hazardous debris in accordance with the dangerous
44 waste designation levels of WAC 173-303.

45
46 Reusable equipment is not waste under the definitions of WAC 173-303 and
47 will not require waste designation. The requirement to designate materials
48 identified as recyclable scrap metal is unnecessary under the scrap metal
49 exclusions of WAC 173-303-120.

7.3.2 Containment Integrity Inspections

Concrete containment surfaces will be inspected to identify cracks (if any) that could have provided a pathway to soils for potential contamination from RCRA operations. The inspections generally will occur before floor decontamination. However, where floor coatings may inhibit inspection and floor surface coatings will be removed, the inspection can occur after coating removal. This does not threaten the environment, even if cracks are found and shown to be through-thickness, because concrete decontamination (scabbling) will not employ solutions that could enter cracks and because scabbling residues will be vacuumed away from cracks as they are generated.

Such cracks (if any) will be identified, mapped, and investigated to determine if they are through-thickness. Cracks that may be through-thickness will be cored to the soil and the cores inspected. Underlying soils will be sampled, as described in Section 7.4, and in accordance with the Ecology approved sampling plan. Soil sample results will be analyzed for the constituents of concern shown in Table 7-1 and results will be compared to closure action levels for soils as described in Section 6.3.

Sawcuts exist in the floor of the 333 Building in the vicinity of Tanks 7 and 11 (Section 2.2.1 and Figure F2-4). These sawcuts are addressed in Section 7.8 dealing with 333 Building closure activities.

7.4 SOIL SAMPLING AND ANALYSIS

The purpose of analytical sampling (if required) would only be to identify and characterize soil contamination resulting from RCRA unit operations to facilitate its future remediation by the CERCLA 300-FF-2 OU. The need for soil sampling at these locations is contingent on a potential for soil contamination from RCRA operations as identified during containment integrity inspections (Section 7.3.2) and is not expected to be necessary for clean closure of TSD unit soils. Sampling of other unit materials or media also is not expected to be required. However, the information in this section is provided to address this contingency.

Waste designation sampling (if necessary) will occur in accordance with WAC 173-303 waste designation requirements as implemented by Environmental Investigations Instruction (EII), 4.2, "Interim Control of Unknown, Suspected, Mixed and Radioactive Waste," (WHC 1988) and will not be a portion of the sampling plan.

7.4.1 Decontamination, Inspection and Sampling and Analysis Plan

If sampling is necessary, the type and quality of analytical data appropriate to verify closure action levels for soil would be determined before sampling. The data will be as specified in an Ecology approved sampling and analysis plan (SAP). However, because the 300 Area WATS closure activities also will be seeking Ecology approval of decontamination and visual

1 inspection methods, the sampling and analysis methods will be documented in a
2 comprehensive Decontamination, Inspection, and Sampling and Analysis Plan
3 (DISAP) that will be developed as follows.

4
5 The DISAP would evolve from a DQO process performed in accordance with
6 DOE-RL guidance and would reflect regulator agreements and RCRA requirements.
7 Process knowledge and unit inspection results would be used to help resolve
8 TSD unit sampling issues such as analytes of interest, sample location, number
9 of samples, number and frequency of field quality control (QC) samples (i.e.,
10 trip blanks, equipment blanks, splits, and duplicates), sampling methodology,
11 sample validation, data evaluation methods, and acceptance of Sitewide
12 background values (DOE/RL 1992b). Sample handling, packaging and shipping,
13 chain of custody, and laboratory quality assurance/ quality control (QA/QC)
14 are either addressed by internal, approved procedures (WHC 1988) or contractor
15 laboratory agreements outside of the DISAP.

16
17 Through-thickness cracks (if any) in concrete secondary containment,
18 located as described in Section 7.3.2, will be sampled. The concrete would be
19 cored at these locations, and biased soil samples taken. Small containment
20 surface cracks will not be sampled.

21
22 Soil sampling (if necessary) would be for constituents of concern to the
23 unit as identified in Table 7-1. These constituents, particularly the heavy
24 metals, would be expected to remain in the upper 30 centimeters (1 foot) of
25 the soil based on the demonstrated ability of the soil at the Hanford Site to
26 absorb these constituents (Routson et al. 1979). Therefore, soils would be
27 sampled only to a depth of 30 centimeters to 91 centimeters (1 foot to
28 3 feet).

31 7.4.2 Data Quality

32
33 To ensure data quality, sampling procedures will be conducted in
34 conformance with all applicable procedures described in Sections II.D and II.E
35 of the RCRA Permit (Ecology et al. 1994b). Laboratory analyses may be
36 conducted in accordance with the most recent edition of *Test Methods for the*
37 *Evaluation of Solid Waste: Physical/Chemical Methods*, SW-846 (EPA 1986) that
38 provides acceptable, although not mandatory, laboratory analytical methods.
39 Additionally, laboratory and field sampling activities will conform to the
40 *Hanford Analytical Services Quality Assurance Plan* (DOE/RL 1994) and the
41 *Hanford Sampling Quality Management Plan* (DOE/RL, 1995a). The EPA guidelines
42 for reporting accuracy, precision, and practical quantitation limits specified
43 in the analytical methods used will be met. The appropriate field QC will be
44 ensured through use of field QC samples. A laboratory QC program will ensure
45 that the validity of analytical results is defined in the laboratory quality
46 assurance (QA) program plan. Appendix 7A contains a Quality Assurance Project
47 Plan (QAPjP) in case the need for sampling arises.

48
49 The QC of sampling records and documentation will be accomplished by
50 following applicable procedures in Section II.E of the RCRA Permit. Sampling
51 records to be kept in the unit operating record will include daily logs of
52 decontamination and sampling activities, chain-of-custody records, and
53 analytical results.

7.4.3 Field Documentation

The personnel conducting the sampling will maintain an official logbook during the sampling. Guidance provided in EII 1.5, "Field Logbooks" (WHC 1988), will be followed. The field logbook will be bound and have consecutively numbered pages. All information pertinent to the sampling must be recorded in the logbook in a legible fashion. The field logbook will be reviewed and signed by the project manager at least daily. If changes are necessary, they will be indicated by a single line drawn through the affected text. The individual responsible for the change will initial and date the entry. Each day's activities or separate sampling episodes must be signed. The logbook should be protected, stored in a safe file or other repository, and kept as a permanent record. Copies of the field logbook will be made available to Ecology upon request.

7.4.4 Modifications to the Sampling Plan

If modifications to the approved DISAP are necessary, the modifications will be recorded in the field logbook along with circumstances requiring the action. The field logbook is reviewed and signed daily by the project manager. This procedure will provide an accurate record of modifications and Westinghouse Hanford Company (WHC) management approval, while allowing sampling to proceed safely and efficiently. When modifications to an established procedure are needed, procedures outlined in EII 1.4, "Deviations from Environmental Investigation Instructions" (WHC-CM-7-7), will be followed.

7.4.5 Evaluation of Data

After receiving the analytical results from the laboratory, the data will be validated, reviewed, summarized, and compared to agreed upon action levels. A percentage of sampling data, as determined during the DQO, will be validated according to requirements described in *Data Validation Procedures for Chemical Analyses* (WHC 1993).

Validated data will be reviewed and summarized. Constituents will be eliminated from further consideration where results are below quantification and detection limits (provided the detection limit is below background) as calculated by the laboratory following guidance in EPA SW-846, Chapter 1, "Quality Assurance" (EPA 1990) and *Characterization and Use of Soil and Groundwater Background for the Hanford Site* (WHC 1991). Constituents that are detected below background as identified in the *Hanford Site Background: Part 1 Soil Background for Nonradioactive Analytes* (DOE/RL 1992) will be eliminated from further consideration. The remaining constituents would be tabulated for further comparison to agreed upon closure 'action levels.'

The appropriate closure 'action level' for RCRA unit soils for constituents of concern identified in Table 7-1 would be identified during a DQO process for the sampling activity. Soil cleanup 'action levels' (if necessary) will be in accordance with the record of decision (ROD) for the 300-FF-2 OU. In accordance with WAC 173-303-610 and as described in Section

6.1, the closure 'action levels' for the Table 7-1 constituents of concern will be the health-based soil cleanup levels calculated using MTCA (WAC 173-340) Method B or Method C formulas (as appropriate). Sampling results would then be compared to these 'action levels' to assess the appropriate level of closure for unit soils.

7.5 REGULATED MATERIAL REMOVED FROM THE UNIT DURING CLOSURE

This section will address regulated materials that will be removed from the unit for disposal, reuse, or recycling. It will identify the decontamination or treatment necessary to achieve the desired end-use for these materials.

7.5.1 Reusable Equipment

The centrifuge located in the 313 Building is the only 300 Area WATS equipment currently being considered for possible reuse. Reusable equipment will be managed to prevent release of dangerous waste to the environment in accordance with DOE-RL guidance provided in *Management of Contaminated Equipment at the Hanford Site* (DOE/RL 1995b).

Reusable equipment will be inspected to ensure the absence of free liquids and will be radiologically surveyed to identify smearable radioactive contamination on the equipment exterior. Smearable contamination will be reduced to fixed contamination levels before reuse. Simple decontamination (e.g., wipedowns or water rinse) will suffice to achieve the appropriate level of worker and environmental protection for reusable equipment. Chemical contamination residues on equipment exterior surfaces may be cleaned by wiping the contaminated equipment with clean paper towels and/or with clean rags.

The equipment will be disconnected from the system, prepared for shipment, and transported to the Hanford Site organization that will reuse the equipment. The nature of potential contamination in the equipment will be identified to prospective users and to equipment transporters. It will be disassembled only to the extent necessary to facilitate appropriate decontamination for removal, transport, and reuse.

7.5.2 Scrap Metal

Metal tanks, pumps, and piping that are not radioactively contaminated above the release limits provided in the *Hanford Site Radiological Control Manual* (HSRCM-1) (WHC 1994) may be removed as recyclable scrap metal. Equipment or components having numbered DOE-RL property control tags will require a DOE-RL Declaration of Excess. Under the scrap metal exclusions of WAC 173-303-120 (2)(a)(iv), recyclable scrap metal is not subject to the dangerous waste designation requirement. At closure, the cost effectiveness of decontamination of metals for recycling as scrap will be weighed against the cost of alternative management options.

Decontamination of scrap metal will be to remove visible waste residues in order to minimize dangerous waste produced during recycling and to minimize the potential for contact with waste during scrap handling. Residue removal from scrap metal does not equate to a 'clean debris surface' standard. Decontaminated scrap metal may be randomly inspected to ensure residue removal. Recyclable material must be radiologically surveyed in accordance with established procedures to allow its free release. The presence of lead painted surfaces does not affect the usability of this material as scrap metal. Decontaminated recyclable materials will be stored in luggers located at the unit and furnished by the recycler until retrieved by the recycler.

7.5.3 Debris

Contaminated debris that is not reusable equipment or considered recyclable as scrap metal (e.g., PVC piping), will be removed from the system for disposal. Before removal from the system (where accessible) or after removal, these materials will undergo waste designation (Section 7.3.2). Materials that do not exceed dangerous waste designation levels will be managed and disposed of as low-level or nonregulated waste. Materials that designate as dangerous waste may be removed and transported to T Plant (T-2-7) for treatment prior to allowing their disposal as low-level or nonregulated waste. Alternately, these materials may be decontaminated in-place or treated at the unit after removal from the system.

The goal of decontamination in-place is to ensure that the materials will not be hazardous debris when finally removed from the system for disposal. Decontamination in-place may use an appropriate physical extraction method from Table 1, "Alternative Treatment Standards for Hazardous Debris" (40 CFR 268.45), such as high pressure water blasting, and will be to a level that ensures a nondangerous waste designation upon removal. Decontamination in-place may use other method(s) that will reduce surface contamination to below designation levels. Such methods include hand washing, brushing, or scrubbing using an approved cleaner such as Built¹ Laundry Detergent or Simple Green² and then rinsing with water. The decontamination activity may occur using a tank, trough or vessel to contain wash and rinse water.

Treatment of debris after removal will use a 'clean debris surface' as the treatment standard for disposal as low-level or nonregulated waste. Treatment after removal to achieve a 'clean debris surface' will require use of an appropriate physical extraction method from Table 1, Alternative Treatment Standards for Hazardous Debris (40 CFR 268.45) such as high pressure water blasting. Hand washing, brushing, or scrubbing using a scouring pad, an approved cleaner such as Built Laundry Detergent or Simple Green, and then rinsing with water, may qualify as vibratory finishing, an appropriate Table 1 physical extraction method, upon Ecology agreement.

¹Built is a trademark of Klix Corporation, San Francisco, California.

²Simple Green is a trademark of Sunshine Makers, Huntington Harbor, California.

1 Upon completion of treatment or decontamination activities, the wash and
2 rinse water will be collected, designated, and managed as described in
3 Section 7.5.4.
4
5

6 7.5.4 Waste Management, Transport, and Disposal 7

8 Decontamination waste, treatment residue, or closure debris will be
9 accumulated in satellite accumulation containers at appropriate locations at
10 the unit. When full, these containers will be moved to a 90-day accumulation
11 area at the unit to await designation in accordance with WAC 173-303-070 and
12 disposal. This waste may be identified as suspected mixed waste based on
13 process knowledge for shipment within the Hanford RCRA Facility or for
14 disposal. Containers used for shipment of regulated materials will be
15 U.S. Department of Transportation-approved containers compatible with the
16 waste being shipped (e.g., 210-liter [55-gallon] drums). The containers will
17 be labeled and shipped under manifest as necessary according to
18 WAC 173-303-180 and WAC 173-303-190. Before shipment, the appropriate waste
19 acceptance documentation will be completed for the receiving unit. After
20 designation, waste will be disposed as follows:
21

- 22 • Dangerous waste will be transported offsite or to the
23 616 Nonradioactive Dangerous Waste Storage Facility to await final
24 disposal or treatment at a permitted TSD facility.
25
- 26 • Low-level radioactive waste (LLRW) may be disposed onsite in the
27 200 Area Low-Level Burial Grounds.
28
- 29 • Low-level radioactive mixed waste (LLRMW) will be transferred to the
30 Central Waste Complex for storage to await further treatment before
31 final disposal.
32
- 33 • Nondangerous and nonradioactive waste may be disposed through
34 contracts with the City of Richland.
35
36

37 7.6 DECONTAMINATION IN-PLACE OF TANK SYSTEM COMPONENTS, STRUCTURES, 38 AND MATERIALS THAT WILL REMAIN AFTER CLOSURE 39

40 Generally, large tanks, concrete containment, and building structures of
41 the 300 Area WATS will remain after closure and must meet the clean closure
42 standard of a 'clean debris surface.' These structures and components are
43 constructed of metal, plastic, poured concrete, and concrete block. Such
44 materials identified during visual inspections as not already meeting the
45 'clean debris surface' standard will be decontaminated in-place as described
46 in the following sections.
47
48

49 7.6.1 Decontamination In-Place of Concrete 50

51 The 300 Area WATS secondary containment is comprised of concrete bermed
52 tank pads and bermed floors, containment catch basins, drainage trenches, and
53 sumps. Building walls are constructed of concrete block that will be

1 similarly decontaminated where a reasonable potential for contamination has
2 been established by process knowledge, historical spill information, and
3 inspections.

4
5 For concrete and concrete block, a 'clean debris surface' requires
6 removal of .6 centimeter (1/4 inch) of the contaminated surface layer.
7 Concrete surfaces indicated by inspections and/or historical spill information
8 presented in the closure plan as being potentially contaminated, will have the
9 surface layer removed to a depth of .6 centimeter (1/4 inch) by scabbling.
10 The decontamination will be documented on a WRRRC for the activity.
11 Achievement of a 'clean debris surface' will be documented on the WRRRC used to
12 document the decontamination activity. Decontamination residues will be
13 collected, designated, and managed as described in Section 7.5.4.

14
15 Acid brick and mortar existing as concrete floor and/or berm coverings in
16 the 313 Building and 303-F Building will not be decontaminated. This material
17 will be removed for disposal, designated, and managed as described in
18 Section 7.5.4.

19 20 21 **7.6.2 Decontamination In-Place of Metal and Plastic**

22
23 Metal or plastic structures and components that will remain in place
24 after closure (e.g., high-density polyethylene tanks, metal tanks, and metal
25 support structures) will be decontaminated in-place to a 'clean debris
26 surface.' For metals or plastic, only removal of contaminants from the
27 surface layer is necessary. Contamination will be removed from surface layer
28 using either high pressure water blasting (a Table 1 physical extraction
29 method) or by hand wiping, washing, brushing, or scrubbing using an approved
30 cleaner (e.g., Built Laundry Detergent or Simple Green) and then rinsing with
31 water. The decontamination will be documented on a WRRRC for the activity.
32 Achievement of a 'clean debris surface' will be documented on the WRRRC used to
33 document the decontamination activity. Decontamination residues will be
34 collected, designated, and managed as described in Section 7.5.4.

35 36 37 **7.7 PHASE 1 CLOSURE ACTIVITIES - THE 313 BUILDING**

38
39 Phase 1 closure will address the uranium recovery room that is the only
40 RCRA operational area of the 313 Building. To accommodate the 313 Building
41 demolition schedule and to provide better access to the floor for
42 decontamination, all RCRA components of the 313 Building will be removed
43 during closure as scrap metal, reusable equipment, or debris. These
44 components include Pumps 2, 7, 8, and 9; metal transfer piping in the room;
45 Tanks 2, 5, 9, 10 and 11; the centrifuge and filter press; and metal support
46 structures.

47
48 The concrete floor and the building structure will remain after closure
49 and the surfaces that have contacted dangerous or mixed waste must meet the
50 clean closure standard of a 'clean debris surface.' These include potentially
51 contaminated metal equipment support structures; a portion of one concrete
52 block building wall; the concrete floor; and metal drainage trench liners.

Before in-place decontamination using decontamination solutions, the floor must be inspected for cracks or other openings that could provide a pathway to soils for decontamination solutions. Such cracks will be sealed before beginning treatment or other engineered containment devices (e.g., portable catch basins, liners) will be used to collect and contain solutions.

7.7.1 Metal Tanks, Pumps, Piping, and the Filter Press

Tanks 2, 5, 9, 10, and 11, piping, and Pumps 2, 7, 8, and 9 will be removed from the unit during closure for recycling or disposal. The material surfaces will undergo waste 'pre-determination' before removal (where accessible) or waste designation after removal, and radiation survey to determine usability as recyclable scrap. Material that would not designate as dangerous waste upon removal but exceeds radioactive release limits may be disposed as low-level waste.

If recycling remains the debris management option (after cost-effectiveness considerations have been weighed), further waste designation will not be necessary. Radiological decontamination and removal of visible waste residues will be performed before recycling as described in Section 7.5.3. Because of the small diameter and intricacy of these piping runs (i.e., small bore stainless steel piping with numerous butt-welded bends) pipe may be cut to gain access for radiological survey and decontamination.

Material that would designate as hazardous debris upon removal and will not be recycled may be transported to T Plant (T-2-7) for treatment before disposal. Alternately, such material may be decontaminated in-place to below waste designation levels (Section 7.6.2) or removed from the system and treated at the unit to a 'clean debris surface' (Section 7.5.3) to allow its disposal as low-level or nonregulated waste. Material decontaminated in-place will undergo final waste designation upon removal from the system and be managed as described in Section 7.5.4. Debris treatment after removal from the system will be documented on a WRRRC. The treated debris will be inspected for a 'clean debris surface' and the inspection documented on the WRRRC used to document treatment. Decontamination or treatment waste will be collected, designated, and disposed as described in Section 7.5.4.

7.7.2 Centrifuge

The centrifuge is potentially reusable equipment. This equipment contains no free liquids and will be cleaned for reuse as described in Section 7.4.1. After cleaning, this equipment will be removed from the unit and transported to the receiving unit. If the centrifuge is not identified for reuse during closure, it will be decontaminated for disposal and managed as waste as described in Section 7.7.1.

7.7.3 Floor and Affected Walls

The concrete floor, including the drainage trench liners, will remain after closure. The portions of the floor, drainage trenches, and wall identified in Figure 7-7 have a history of exposure to chemical spills and must meet the 'clean debris surface' clean closure standard. Because floor coatings may have covered-over contamination from spills, the bermed areas of the uranium recovery room floor will be decontaminated to a 'clean debris surface' by scabbling off at least .6 centimeter (1/4 inch) of the potentially contaminated surface layer as described in Section 7.6.1.

Acid brick in the room (i.e., that caps the berm around bermed area 1, and that lies below floor coatings in bermed areas 1 and 3) cannot be decontaminated. The acid brick and the grout base beneath the acid brick will be removed to the original concrete surface, surveyed for radioactivity, and disposed as mixed or dangerous waste. Because the decontamination performance standards are the same for all portions of the matrix (i.e., concrete, grout, and brick) and because the acid brick is integral to this surface, its removal will constitute removal of the .6 centimeter (1/4 inch) surface for these areas. The concrete floor beneath the acid brick removal area will be inspected for a 'clean debris surface.' Where acid brick removal does not achieve this standard, the concrete will be scabbled sufficiently to remove the unacceptable visual indications.

The lower 15 centimeters (6 inches) of the walls around the bermed areas and an area of the west wall near Tank 2 that is approximately 1.2 meters (4 feet) wide starting at the floor and extending upward to the height of the block wall (approximately 2.4 meters (8 feet) will also be decontaminated by scabbling in the same manner as the concrete floor.

The scabbling activity will be documented on a WRRRC for all concrete surfaces. The acid brick removal area and the scabbled concrete floor will be inspected to verify achievement of a 'clean debris surface,' and acceptance will be documented on the WRRRC(s) used to document the decontamination activity. Debris from scabbling will be collected, designated, and disposed as described in Section 7.5.4.

The stainless steel liners for the two drainage trenches predate RCRA operations (BHI 1993) and will remain in-place after closure. The exposed surfaces of the metal drainage trench liners will be decontaminated to a 'clean debris surface' by water blasting, hand-scrubbing, or other appropriate method as described in Section 7.6.2. The decontamination will be documented on a WRRRC. The liners will be inspected to verify achievement of a 'clean debris surface' and the inspection will be documented on the WRRRC used for the decontamination. Decontamination solutions and rags, etc., will be collected and disposed as dangerous waste or, if radioactive, as mixed waste.

7.7.4 Soils Beneath the 313 Building

After scabbling, the uranium recovery room floor surface will be inspected for cracks (if any) that could be through-thickness. Such cracks will be identified, mapped, and investigated to determine if they are through-

1 thickness. Potential through-thickness cracks will be cored and the
2 underlying soils sampled as described in Section 7.4 and in accordance with
3 the Ecology-approved DISAP. Soil sample results will be analyzed and
4 analytical results will be evaluated against soil closure levels as described
5 in Section 7.4.5.

6 7 8 **7.8 PHASE 2 CLOSURE ACTIVITIES**

9
10 Phase 2 of 300 Area WATS closure will address closure of the
11 333 Building, the 334-A Building, and the 303-F Building, not necessarily in
12 that order.

13 14 15 **7.8.1 The 333 Building**

16
17 Closure of the 333 Building will address metal Tanks 7 and 11; PVC drain
18 piping routed from fuel fabrication process Tanks 5, 7, 9, 10, 11, 13, 15, 19,
19 26 and 31 to the 334-A Building storage tanks; and the concrete floor beneath
20 Tank 11. Aside from the drain piping, all of the RCRA components and affected
21 surfaces exist in one small area of the 333 Building.

22
23 **7.8.1.1 PVC Drain Piping.** The PVC drain piping from fuel fabrication process
24 Tanks 5, 7, 9, 10, 11, 13, 15, 19, 26 and 31 to the 334-A Building storage
25 tanks will be removed for disposal. Piping will be disconnected from control
26 valves beneath the process tanks and removed from the pipe and drainage
27 trench.

28
29 The piping will undergo waste designation upon removal. If the material
30 does not designate as dangerous waste but exceeds radioactive release limits,
31 it may be disposed as low-level waste.

32
33 Piping that would designate as hazardous debris upon removal may be
34 transported to T Plant (T-2-7) for treatment before disposal. Alternately,
35 piping may be treated at the unit to a 'clean debris surface' (Section 7.5.3)
36 to allow its disposal as low-level or nonregulated waste. The treatment will
37 be documented on a WRRRC. The treated piping will be inspected for a 'clean
38 debris surface' and the inspection documented on the WRRRC used to document
39 treatment. Decontamination or treatment waste will be collected, designated,
40 and disposed as described in Section 7.5.4.

41
42 **7.8.1.2 Tanks 7 and 11.** Tanks 7 and 11 will be removed for processing as
43 recyclable scrap metal to gain access to the concrete floor for
44 decontamination. Upon removal, the tanks will undergo radiation survey.
45 Process knowledge indicates that the waste from Tanks 7 and 11 was not
46 radioactive and the tanks are not expected to exceed radioactive release
47 limits. Any visible waste residues will be removed by hand scrubbing and the
48 tanks will be processed as recyclable scrap metal as described in
49 Section 7.5.2. Decontamination solutions and rags, etc., will be collected
50 and disposed as dangerous waste or, if radioactive, as mixed waste.
51

1 **7.8.1.3 Concrete Floor.** The concrete floor of the 333 Building will remain
2 after closure and, therefore, must achieve a 'clean debris surface' as the
3 clean closure standard. Figure 7-6 describes the portion of the 333 Building
4 floor that will undergo surface decontamination. This area will
5 have .6 centimeter (1/4 inch) of the surface removed to a 'clean debris
6 surface' by scabbling as described in Section 7.6.1. The decontamination
7 activity will be documented on a WRRRC. The scabbled surface will be inspected
8 to verify achievement of a 'clean debris surface' and the inspection will be
9 documented on the WRRRC used to document the decontamination. The fine surface
10 crack in the impermeable coating over the floor at this location (Chapter 3.0)
11 will not require sealing before scabbling.
12

13 **7.8.1.4 Soils Beneath the 333 Building.** The impermeable floor coating at
14 this location predates 1980 and RCRA operations at the unit. If any cracks
15 exist beneath this surface, any contamination in those cracks also would
16 predate RCRA operations. Because the single, fine crack in the floor coating
17 does not provide a potential for soil contamination, soil sampling is not
18 being considered for this location.
19

20 **7.8.2 The 334-A Building**

21
22
23 Closure of the 334-A Building will address metal Tank A; plastic Tanks B
24 and C; PVC waste acid transfer piping in the building; contaminated structures
25 (e.g., metal tank supports, pit access ladder); and the concrete tank-pit
26 including the floor and lower .6 meter (2 feet) of the walls.
27

28 **7.8.2.1 PVC Piping.** The PVC drain piping will be removed for disposal to
29 gain access to tanks requiring decontamination. Upon removal, piping will
30 undergo radiation survey and waste designation. If the material does not
31 designate as dangerous waste but exceeds radioactive release limits, it may be
32 disposed as low-level waste.
33

34 Piping that would designate as hazardous debris upon removal may be
35 transported to T Plant (T-2-7) for treatment before disposal. Alternately,
36 such material may be decontaminated in-place to below waste designation levels
37 (Section 7.6.2) or removed from the system and treated at the unit to a 'clean
38 debris surface' (Section 7.5.3) to allow its disposal as nondangerous or low-
39 level waste. Material decontaminated in-place will undergo final waste
40 designation upon removal from the system and be managed as described in
41 Section 7.5.4. Debris treatment after removal from the system will be
42 documented on a WRRRC. The debris will be inspected for a 'clean debris
43 surface' and the inspection documented on the WRRRC used to document treatment.
44 Decontamination or treatment waste will be collected, designated, and disposed
45 as described in Section 7.5.4.
46

47 **7.8.2.2 Metal Tank Supports and Pit Access Ladder.** Metal tank supports and
48 the pit access ladder will remain after closure and so must meet the 'clean
49 debris surface' clean closure standard. These materials will be inspected to
50 determine if they already meet this standard. If decontamination is
51 necessary, they will be hand washed or scrubbed to a 'clean debris surface' as
52 described in Section 7.6.2. Decontamination will be documented on a WRRRC.

1 The decontaminated surface will be inspected to verify achievement of a 'clean
2 debris surface' and acceptance will be documented on the WRRRC used to document
3 decontamination. Decontamination solutions and rags, etc., will be collected,
4 designated, and managed as described in Section 7.5.4.

5
6 7.8.2.3 Metal Tank A. Metal Tank A will remain after closure and, therefore,
7 must meet the 'clean debris surface' clean closure standard. However, Tank A
8 was cleaned and the plastic liner was removed when the tank was taken out of
9 service in 1988. The tank has been open since then and contains minor amounts
10 of nonregulated debris (dirt) that has fallen into it from the grating above.
11 No regulated waste or waste residues from operations is expected to exist in
12 this tank. However, the tank will be vacuumed to remove any dirt. It then
13 will be inspected for achievement of a 'clean debris surface' and acceptance
14 will be documented on a WRRRC.

15
16 7.8.2.4 Plastic Tanks B and C. Polyethylene plastic Tanks B and C will
17 remain in-place after closure and must achieve a 'clean debris surface' for
18 clean closure. Because tank exteriors have been exposed to contaminated
19 effluent and it is known that dangerous waste residues exist in these tanks,
20 both interior and exterior surfaces will be decontaminated. Before
21 decontamination, the tanks and surrounding containment will be inspected for
22 openings that could allow the escape of decontamination fluids.

23
24 Decontamination will be by water blasting and/or hand scrubbing as
25 described in Section 7.6.2. The grating above the tanks may be removed to
26 facilitate access to tank interiors. The tanks may be entered for
27 decontamination and inspection, as necessary, after obtaining proper entry
28 permit(s). The decontamination will be documented on a WRRRC. The
29 decontaminated tank surfaces will be visually inspected to verify attainment
30 of a 'clean debris surface' and the inspections documented on the WRRRC used to
31 document the decontamination. Waste residues or decontamination solutions
32 will be collected, designated, and disposed of as described in Section 7.5.4.

33
34 7.8.2.5 Concrete Tank Pit. The concrete tank pit will remain after closure
35 and, therefore, must achieve a 'clean debris surface' as the clean closure
36 standard. Because of a history of spills to the tank pit floor and walls, the
37 floor and lower .9 meter (3 feet) of the walls will undergo surface
38 decontamination by scabbling off at least .6 centimeter (1/4 inch) of the
39 potentially contaminated surface layer.

40
41 Before decontamination, the concrete surface will be inspected for cracks
42 that could provide a pathway to soils for decontamination solutions. To
43 facilitate the inspection, tank-pit wall coverings will be removed from the
44 walls and disposed as dangerous waste or mixed-waste, if radioactive.

45
46 The decontamination will be documented on a WRRRC. The decontaminated
47 concrete surfaces will be inspected to verify achievement of a 'clean debris
48 surface' and the inspections documented on the WRRRC used to document the
49 decontamination activity. Debris from scabbling will be collected,
50 designated, and disposed as described in Section 7.5.4.

7.8.2.6 Soils Beneath the 334-A Building. After tank pit scabbling, the exposed floor surface will be inspected for through-thickness cracks that would indicate containment failure and the subsequent need for any soil sampling. Cracks (if any) will be identified, mapped, and investigated to determine if they are through-thickness. Cracks that may be through-thickness will be cored to the soil and the cores inspected. The soil beneath through-thickness cracks will be sampled as described in Section 7.4 and in accordance with the Ecology-approved DISAP. Soil sample results will be analyzed and analytical results will be evaluated against soil closure levels as described in Section 7.5.4.

7.8.3 The 303-F Building

Closure activities for the 303-F Building will address metal Pumps P-40 and 50, transfer piping in the building (including two in-line cartridge filters), and the metal-lined catch basin.

7.8.3.1 Pumps and Transfer Piping in the Building. Transfer piping in the building, including two small pumps and in-line cartridge filters, will be removed during closure for recycling as scrap metal or for disposal to gain access to the catch basin for decontamination.

Before or after removal, the material will undergo radiation survey to determine the feasibility of recycling as scrap metal. If recycling is the debris management option (after cost-effectiveness considerations have been weighed), further waste designation will not be necessary. Radiological decontamination and removal of visible waste residues will be performed before recycling (Section 7.5.3). Because of the small diameter and intricacy of these piping runs (i.e., small bore stainless steel piping with numerous butt-welded bends) pipe may be cut to gain access for radiological survey and decontamination.

Material removed for disposal will undergo waste designation before removal (if accessible). If the material does not designate as dangerous waste but exceeds radioactive release limits, it may be disposed as low-level waste.

Material that would designate as hazardous debris upon removal and is not considered radiologically releasable, may be transported to T Plant (T-2-7) for treatment before disposal. Alternately, such material may be decontaminated in-place to below waste designation levels (Section 7.6.2) or removed from the system and treated at the unit to a 'clean debris surface' (Section 7.5.3) to allow its disposal as nondangerous or low-level waste. Material decontaminated in-place will undergo final waste designation upon removal from the system and will be managed as described in Section 7.5.4. Debris treatment after removal from the system will be documented on a WRRRC. The treated debris will be inspected for a 'clean debris surface' and the inspection documented on the WRRRC used to document treatment. Decontamination or treatment waste will be collected, designated, and disposed as described in Section 7.5.4.

1 **7.8.3.2 Catch Basin.** The catch basin is composed of acid brick and metal
2 surfaces that are contaminated with visible, white waste residues. Because
3 the catch basin will remain after closure, it must meet the clean closure
4 criteria of a 'clean debris surface.'

5
6 The acid brick that lines the catch basin cannot be decontaminated and
7 will be removed. The acid brick is considered integral to this surface and
8 its removal will constitute removal of the .6 centimeter (1/4 inch) surface
9 for these areas. The concrete beneath the acid brick removal area will be
10 scabbled to remove any unacceptable visual indications to meet the standard of
11 a 'clean debris surface.' The acid brick removal activity and the scabbling
12 activity will be documented on a WRRRC. The acid brick removal area and the
13 scabbled concrete may be inspected at the same time and acceptance documented
14 on the WRRRC(s) used to document the decontamination. The acid brick debris
15 and the scabbling residues will be disposed as dangerous or mixed waste, if
16 radioactive.

17
18 The surface of the metal catch basin liner will be decontaminated by
19 water-blasting or hand-scrubbing to a 'clean debris surface' as described in
20 Section 7.6.2. The decontamination will be documented on WRRRC. The materials
21 will be inspected to verify achievement of a 'clean debris surface' and the
22 inspection documented on the WRRRC used to document decontamination.
23 Decontamination solutions and rags, etc., will be collected, designated, and
24 disposed as described in Section 7.5.4.

25
26 **7.8.3.3 Building Structure.** Although difficult to visually verify on the
27 white painted surface of the adjacent concrete block wall, waste residues also
28 could exist there. The lower .6 meter (2 feet) of the east and south concrete
29 block wall immediately adjacent to the catch basin will be scabbled to a
30 'clean debris surface' by the removal of .6 centimeter (1/4 inch) of the
31 surface layer. Decontamination will be documented on a WRRRC. The
32 decontaminated concrete surfaces will be inspected to verify achievement of a
33 'clean debris surface' and the inspections documented on the WRRRC used to
34 document the decontamination. Debris from scabbling will be collected,
35 designated, and disposed as described in Section 7.5.4.

36
37 **7.8.3.4 Soils Beneath the 303-F Building.** The stainless steel catch basin
38 liner has been in place since the installation of 303-F Building RCRA
39 components and has remained intact. There have been no documented spills to
40 this location even though waste residues are visible on components and some
41 undocumented spillage may have occurred. However, the catch basin would have
42 kept any spills from reaching soils at this location and precluded the
43 possibility of soil contamination from RCRA operations. Consequently,
44 inspections for containment failure and the subsequent need for soil sampling
45 will not be necessary at this location.

46 47 48 **7.9 PHASE 3 CLOSURE ACTIVITIES**

49
50 Phase 3 of closure will address the 311 Tank Farm, the 334 Tank Farm,
51 and piping in the pipe trenches.
52

7.9.1 The 311 Tank Farm

Closure of the 334 Tank Farm will address Tanks 40 and 50; Pump 10; transfer piping at the tank farm (not in the pipe trench); and the concrete catch basins around Tanks 40 and 50. The 311 Tank Farm is outdoors and all components are exposed to the weather.

7.9.1.2 Tank 40 and Tank 50. Tanks 40 and 50 will remain after closure and must meet the 'clean debris surface' standard. The tanks will be decontaminated in-place to a 'clean debris surface' using a high-pressure water wash or by hand washing. Only minor cracks exist in concrete containment coatings, and crack repair or sealing likely will not be necessary before decontamination. However, before decontamination, the tanks and containment surfaces will be reinspected to ensure that no cracks or openings exist that could allow the escape of decontamination solutions.

Decontamination will be documented on a WRRRC for the activity. Decontaminated tank surfaces will be inspected to verify achievement of a 'clean debris surface' and the inspections will be documented on the WRRRC used to document decontamination. Decontamination solutions and materials will be collected, designated, and disposed as described in Section 7.5.4.

7.9.1.3 Pump 10 and Transfer Piping. Pump 10 and metal transfer piping will be removed from the unit at closure for recycling or disposal. The material will undergo waste predetermination before removal (where accessible) or waste designation after removal, and radiation survey to determine usability as recyclable scrap. Material that would not designate as dangerous waste upon removal but exceeds radioactive release limits may be disposed as low-level waste.

If recycling is the debris management option (after cost-effectiveness considerations have been weighed), further waste designation will not be necessary. Radiological decontamination and removal of visible waste residues will be performed before recycling as described in Section 7.5.3. Because of the small diameter and intricacy of these piping runs (i.e., small bore stainless steel piping with numerous butt-welded bends) pipe may be cut to gain access for radiological survey and decontamination.

Material that would designate as hazardous debris upon removal and is not considered radiologically releasable may be transported to T Plant (T-2-7) for treatment before disposal. Alternately, such material may be decontaminated in-place to below waste designation levels (Section 7.6.2) or removed from the system and treated at the unit to a 'clean debris surface' (Section 7.5.3) to allow its disposal as low-level or nonregulated waste. Material decontaminated in-place will undergo final waste designation upon removal from the system and will be managed as described in Section 7.5.4. Debris treatment after removal from the system will be documented on a WRRRC. The treated debris will be inspected for a 'clean debris surface' and the inspection documented on the WRRRC used to document treatment. Decontamination or treatment waste will be collected, designated, and disposed as described in Section 7.5.4.

1 7.9.1.4 Concrete Catch Basin for Tank 40. The concrete containment catch
2 basin will remain after closure and achieve the 'clean debris surface'
3 standard. Because of documented spills to this location and the potential for
4 contamination to have been covered-over with subsequent surface coatings, the
5 catch basin floor and lower 30 centimeters (12 inches) of the catch basin
6 walls and the concrete tank supports will be decontaminated by scabbling off
7 .6 centimeter (1/4 inch) of the concrete surface. The decontamination will be
8 documented on a WRRC. The decontaminated surface will be inspected to verify
9 achievement of a 'clean debris surface' and acceptance documented on the WRRC
10 used to document the decontamination activity. Decontamination residues from
11 scabbling will be collected, designated, and disposed as described in
12 Section 7.5.4.

13
14 7.9.1.5 Concrete Catch Basin for Tank 50. The Tank 50 concrete containment
15 catch basin will remain after closure and must meet the 'clean debris surface'
16 standard. This catch basin was installed in 1985 and still has the original
17 surface coating. Because there have been no documented spills to this
18 location and preliminary inspections indicate no visual evidence of spills or
19 waste residues existing at this location, decontamination of the Tank 50 Catch
20 Basin currently is considered unnecessary. The location will be inspected for
21 achievement of a 'clean debris surface' without decontamination and acceptance
22 will be documented on a WRRC for the location. Before inspection, any loose
23 dirt and debris will be removed.

24
25 7.9.1.6 Soils Beneath the 311 Tank Farm. Preliminary inspections show that
26 no cracks exist in the Tank 50 Concrete Pad that would indicate containment
27 failure and the subsequent need for soil sampling. However, the pad will be
28 reinspected at closure and the results documented.

29
30 The decontaminated concrete surface of the Tank 40 Catch Basin will be
31 inspected for cracks that would indicate containment failure and the
32 subsequent need for any soil sampling. Cracks that could be through-thickness
33 (if any) will be identified, mapped, and investigated to determine if they are
34 through-thickness. Cracks that may be through-thickness will be cored to the
35 soil and the cores inspected. The soils beneath cracks shown to be through-
36 thickness will be sampled as described in Section 7.4 and in accordance with
37 the Ecology-approved DISAP. Soil sample results will be analyzed and
38 analytical results will be evaluated against soil closure levels as described
39 in Section 7.5.4.

40 41 42 7.9.2 The 334 Tank Farm

43
44 Closure of the 334 Tank Farm will address the painted metal support
45 structure for Tank 4, the uncoated concrete containment pad and drainage
46 trench, and the trench cover(s). These materials are outdoors and exposed to
47 the weather. This location received only one documented spill which was from
48 Tank 4 in 1986. Tank 4 was removed in 1988. Years of exposure to weather is
49 expected to have rendered the concrete pad and the Tank 4 support structure
50 decontaminated.

7.9.2.1 Tank 4 Support Structure. The Tank 4 metal support structure will remain after closure and must meet the 'clean debris surface' standard. The potentially contaminated portion of the structure will be inspected to determine if it already meets this standard as a result of natural decontamination by weathering. The paint on the structure surface predates RCRA operations. Visible rust exists on portions of the structure that is not dangerous waste residue and will not affect achievement of a 'clean debris surface.' The acceptance of this surface as a 'clean debris surface' will be documented on a WRRRC for this location.

If portions of the structure do not meet the 'clean debris surface' standard, the structure will be decontaminated to a 'clean debris surface' by hand washing or wiping as described in Section 7.6.2. A 'clean debris surface' is achievable without removal of the paint where the paint is the original surface. Decontamination will be documented on a WRRRC for the activity. The decontaminated surfaces will be inspected for achievement of a 'clean debris surface' and acceptance will be documented on the WRRRC used to document the decontamination.

7.9.2.2 Concrete Pad and Drainage Trench. The bermed concrete pad and drainage trench will remain after closure and must meet the 'clean debris surface' standard. Because of the limited exposure of this location to contamination (i.e., one documented spill in 1986), the characteristic nature of the spilled effluent, and long-term exposure to weather, it is anticipated that the pad already meets this standard. The pad could not reasonably be expected to have retained waste characteristics that would cause the material to designate as dangerous waste upon future removal or to even be detectable by sampling. The pad currently satisfies WAC 173-303-610(2) clean closure performance standards by posing no threat to human health and the environment and WAC 173-303-640 (8)(a) tank system clean closure requirements by having no remaining residues. Therefore, the pad will be inspected to verify existence of a 'clean debris surface' without concrete removal and the inspection will be documented on a WRRRC. Before inspection of the pad and trench, any loose dirt or debris will be removed.

Although the drainage trench may also have been decontaminated by weather, due to the trench covers, it may have a greater potential for waste residues to remain. The trench cover(s) will be removed and the trench inspected to see if it also already meets the 'clean debris surface' standard and the inspection will be documented on a WRRRC. If decontamination is necessary, the trench surface will be scabbled, as described in Section 7.6.1, to a 'clean debris surface.' The scabbling activity will be documented on a WRRRC. Inspection and acceptance of the scabbled surfaces will be documented to the WRRRC used to document the decontamination. Decontamination residues will be collected, designated, and disposed as described in Section 7.5.4.

The trench covers will also be inspected to determine if they already meet the standard. If decontamination is necessary, they will be hand washed or scrubbed to a 'clean debris surface' as described in Section 7.6.2. Decontamination will be documented on a WRRRC. The decontaminated surface will be inspected to verify achievement of a 'clean debris surface' and acceptance

1 will be documented on the WRRRC used to document decontamination.
2 Decontamination solutions and rags, etc., will be collected, designated, and
3 managed as described in Section 7.5.4.
4

5 **7.9.2.3 Soils Beneath the 334 Tank Farm.** Preliminary inspections show that
6 no cracks exist in the concrete pad that would indicate containment failure
7 and the subsequent need for any soil sampling. However, the pad will be
8 inspected and the results documented as described in Section 7.3.
9

10 The trench will be inspected for through-thickness cracks that would
11 indicate containment failure and the subsequent need for any soil sampling.
12 Cracks (if any) will be identified, mapped, and investigated to determine if
13 they are through-thickness. Cracks that may be through-thickness will be
14 cored to the soil and the cores inspected. The soil beneath through-thickness
15 cracks will be sampled as described in Section 7.4 and in accordance with the
16 Ecology-approved DISAP. Soil sample results will be analyzed and analytical
17 results will be evaluated against soil closure levels as described in
18 Section 7.5.4.
19

20 21 **7.9.3 Waste Acid Transfer Piping in Pipe Trenches** 22

23 The 300 Area WATS transferred waste acid through stainless steel and PVC
24 piping that exists in pipe trenches located between buildings or tank farms
25 (Figure 2-3). The concrete pipe trench coverblocks will be removed for pipe
26 removal and disposal. After removal, the piping will undergo waste
27 designation and radiation survey. If the waste does not designate as
28 dangerous waste but is radioactive, it will be disposed as low-level waste.
29

30 If recycling of stainless steel piping as scrap metal is the debris
31 management option (after cost-effectiveness considerations have been weighed),
32 further waste designation will not be necessary. Radiological decontamination
33 and removal of visible waste residues, as described in Section 7.5.3, will be
34 performed before recycling. Pipe may be cut to gain access for radiological
35 survey and decontamination.
36

37 Piping that would designate as dangerous waste and will not be recycled
38 may be transported to T Plant Complex for treatment before disposal.
39 Alternately, such material may be treated at the unit to a 'clean debris
40 surface' as described in Section 7.5.3. This will allow its disposal as low-
41 level or nonregulated waste. Piping treated after removal from the system
42 will be inspected for a 'clean debris surface' and the inspection documented
43 on the WRRRC used to document treatment. Decontamination or treatment waste
44 will be collected, designated, and disposed as described in Section 7.5.4.
45

46 As discussed in Section 6.1, closure of the concrete pipe trenches and
47 investigation of the soils beneath the trenches will be addressed by the RI/FS
48 process for the CERCLA 300-FF-2 OU.
49
50

7.10 OTHER ACTIVITIES REQUIRED FOR CLOSURE

If sampling is performed and sampling results indicate RCRA soil contamination above clean closure levels, either modified closure or an expedited response (before RCRA closure) will be initiated (Section 6.1). Existing floor or concrete pad over such contamination will remain pending its remediation by the 300-FF-2 OU.

If a temporary containment structure (greenhouse) is required to control airborne contamination generated during decontamination activities, such a greenhouse would be constructed in accordance with the appropriate job safety documents. It would provide negative air pressure, airlocked entry and exits, high efficiency particulate filtration (HEPA), and other attributes, as necessary, to protect workers and the environment.

All equipment brought onsite and used during closure activities will be decontaminated or disposed according to the following site-specific requirements:

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

Closure will address worker safety and environmental protection concerns by implementation of requirements found in existing WHC environmental and health and safety program manuals (e.g., WHC-CM-1-10, WHC-CM-4-41, WHC-CM-7-5) or by initiation of a job-specific health and safety plan (HASp) as will be determined at time of closure.

Figure 6-1 indicates that decontamination or treatment residues generated during closure may be removed from the unit as dangerous or mixed waste without treatment or may undergo treatment before storage or disposal. However, treatment of decontamination or treatment residues will not occur as a portion of 300 Area WATS closure activities. Such waste will be collected, designated, and managed as described in Section 7.5.4.

7.11 PERSONNEL TRAINING

Appendix 7B contains a brief description of training courses that fulfill WAC 173-303-330 requirements for workers performing closure activities at a TSD unit containing both radioactive and dangerous waste hazards. Before performing actual closure activities, site-specific work plans detailing specific work activities, site conditions, closure materials, and closure equipment will be provided to Ecology. These documents may provide additional personnel training requirements than those described in Appendix 7A.

7.12 SCHEDULE OF CLOSURE

Closure of the 300 Area WATS will occur using a three-phased approach that will proceed according to the schedules presented in Figures 7-3 through 7-5. Phase 1 closure (Figure 7-3) addressing the 313 Building is scheduled to begin in the spring of 1996. Phase 2 closure (Figure 7-4) will address the 333, 334-A, and the 303-F Buildings. Phase 3 closure (Figure 7-5) will address the 311 and 334 Tank Farms and the piping in the pipe trenches. Closure activities for the 300 Area WATS may begin upon notification by Ecology of closure plan approval or upon notification from Ecology to proceed with closure activities as described in the closure plan.

The closure plan is expected to be approved by Ecology through inclusion of the plan into the RCRA Permit (Ecology et al. 1994b) in July 1997 during RCRA Permit Modification C. The WAC 173-303-610 (4)(b) provides 180 days after closure plan approval to complete closure activities, which for the 300 Area WATS would reflect a closure date of approximately January 1998. However, due to the size of the unit, the complexity of closure activities, and associated closure costs, the schedule for 300 Area WATS closure has been established to allow the extension of closure period to the end of the 1998 fiscal year (September 30, 1998).

7.13 AMENDMENT OF PLAN

The closure plan for the 300 Area WATS will be amended whenever changes in operating plans or facility design affect the closure plan; whenever there is a change in the expected year of closure; or if, when conducting final closure activities, unexpected events require closure plan modification. This plan may be amended any time before the certification of final closure of the 300 Area WATS.

If an amendment of the closure plan is required after its approval via inclusion into the RCRA Permit, DOE-RL will submit a written request to Ecology, asking for authorization to revise the plan via RCRA Permit modification. The written request will include a copy of the closure plan amendment in accordance with WAC 173-303-610(3).

7.14 CERTIFICATION OF CLOSURE AND SURVEY PLAT

Within 60 days of final closure of the 300 Area WATS, DOE-RL will submit a certification of closure to Ecology. The certification of closure will be signed by both the DOE-RL and an independent PE registered in the state of Washington, stating that the unit has been closed in accordance with the approved closure plan. The certification will be submitted by registered mail or an equivalent delivery service. Documentation supporting the closure certification will be retained and furnished to Ecology upon request. The DOE-RL and the PE will certify by signing a document similar to Figure 7-2.

1 If clean closure is not attained, the owner or operator will submit to
2 the local zoning authority, or to the authority with jurisdiction over local
3 land use, a survey plat indicating the location and dimensions of the 300 Area
4 WATS. The EPA also will be provided with a survey plat. The plat will show
5 the facility location with respect to permanently surveyed benchmarks, and
6 will be prepared and certified by a professional land surveyor. The plat also
7 will contain a note, prominently displayed, stating the owner's obligation to
8 restrict disturbance of the surveyed area.

WASTE AND RESIDUE REMOVAL CHECKLIST
300 Area Waste Acid Treatment System

This checklist is intended to document a "clean debris surface" for the following components, structures and/or materials.

1. Building/location: _____
2. Component(s)/Area(s): _____
3. Material (e.g., concrete, metal, plastic): _____
4. Decontamination/Treatment Method¹ (NA if not performed): _____
5. Decontamination/Treatment Parameters (NA if not applicable):
 - a. Temperature _____
 - b. Propellant _____
 - c. Solid Media (e.g., shot, grit, beads) _____
 - d. Pressure _____
 - e. Residence time _____
 - f. Surfactant(s) _____
 - g. Detergents _____
 - h. Grinding/striking media (e.g., wheels, piston heads) _____
 - i. Depth of surface layer removal (cm) (e.g., for concrete) _____
 - j. Other _____

The decontamination of the components/areas/materials identified in steps 1 - 3 was completed as specified at steps 4 and 5. Enter NA if decontamination was not performed for these materials.

_____	_____	_____
Title	Signature	Date

6. Performance Standard:

I have visually inspected the above identified material before/after (circle one) decontamination/treatment in accordance with the closure plan (if specified above). All dangerous waste residues have been removed to attain a clean debris surface².

Authorized Representative:	_____	_____
	Signature	Date

Notes:

1. Although not mandatory, decontamination may use a physical extraction method from Table 1, Alternative Treatment Standards for Hazardous Debris (40 CFR 268.45). Treatment will use an appropriate Table 1 method.
2. Clean debris surface as defined in Table 1, Alternative Treatment Standards for Hazardous Debris (40 CFR 268.45): Surface, when viewed without magnification, is free of all visible contaminated soil and dangerous waste, except allowed as follows:
 - a) Residual staining from soil and waste consisting of light shadows, slight streaks and minor discoloration.
 - b) Soil and waste in cracks, crevices and pits limited to no more than 5 percent of each square inch of surface area.

Figure 7-1. Clean Debris Surface Checklist.

**CLOSURE CERTIFICATION
FOR**

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

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

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

Date

Signature Independent Registered Professional Engineer
(Typed Name, Washington State Professional Engineer license number, and date
of signature)

P.E.# _____

State _____

Date _____

Figure 7-3. Schedule for Phase I Closure of the 300 Area Waste Acid Treatment System.

F7-3

Figure 7-4. Schedule for Phased 1 Closure of the 300 Area Waste Acid Treatment System.

1
2

Figure 7-5. Schedule for Phase 3 Closure of the 300 Area Waste Acid Treatment System.

H95100139.4

1
2

Figure 7-6. The 300 Area Waste Acid Treatment System
Portion of the 333 Building.

F7-6

H96010003.1

1 Figure 7-7. Plan View 313 Uranium Recovery Room Scabble Area.

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Table 7-1. Soil Cleanup Levels for Potential Compliance Constituents.

Constituent	CAS #	Background ^c mg/kg (ppm)	Method A cleanup level ^a mg/kg (ppm)	Method B cleanup levels ^e mg/kg (ppm)		Method C cleanup levels ^f mg/kg (ppm)	
				Carcinogenicity	Toxicity	Carcinogenicity	Toxicity
Metals							
Barium	7440-39-3	175.0	b	h	5.6+3	h	2.45+5
Beryllium	7440-41-7	1.8	b	2.33-1	4.0+2	3.05+1	1.75+4
Chromium	16065-83-1	28.0	100.0	h	8.0+4	h	3.5+6
Copper	7440-50-8	30.0	b	h	2.96+3	h	1.3+5
Lead	7439-92-1	14.9	250.0	g	g	g	g
Mercury	7439-97-6	1.3	1.0	h	2.4+1	h	1.05+3
Nickel	7440-02-0	25.0	b	h	1.6+3	h	7.0+4
Vanadium	7440-62-2	107.0	b	h	5.6+2	h	2.45+4
Zinc	7440-66-6	79.0	b	h	2.4+4	h	1.05+6
Anions							
Nitrate	14797-55-8	208.0	b	h	1.2+5	h	5.6+6
Nitrite	14797-55-0	d	b	h	8.0+3	h	3.5+5

Notes:

- a. Method A cleanup levels from MTCA, WAC 173-340-740, Table 2, Method A Cleanup Levels -- Soil.
- b. No Method A cleanup level for this constituent.
- c. 95/95 reference threshold value from Hanford Site Background: Parts 1 and 2, Soil Background for Nonradioactive Analytes (DOE/RL 1992).
- d. Not calculated in Hanford Site background document (DOE/RL 1992).
- e. Method B cleanup levels from formulas in MTCA, WAC 173-340-740 (DOE/RL 1992), as shown in the CLARC II Database (Ecology 1993).
- f. Method C cleanup levels from formulas in MTCA, WAC 173-340-745, Soil Cleanup Standards for Industrial Sites, as shown in the CLARC II Database (Ecology 1993).
- g. Insufficient toxicity (reference dose) information or carcinogenicity information is available from the EPA to calculate a health-based cleanup level.
- h. Not classified as a carcinogen or insufficient EPA carcinogenicity information available (EPA 1994).

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8.0 POSTCLOSURE

This closure plan proposes clean closure of the 300 Area WATS TSD unit. However, if dangerous waste constituents originating from RCRA unit operations are identified in unit soils above clean closure levels pending cleanup by the 300-FF-2 OU, the unit will undergo an alternative form of RCRA closure. This chapter identifies two alternative RCRA unit closure methods, both of which would require postclosure care.

8.1 CLOSURE ALTERNATIVES REQUIRING POSTCLOSURE CARE

This section identifies possible alternative RCRA unit closure methods as modified closure or closure as a landfill, either of which would require postclosure care.

8.1.1 Modified Closure

Modified closure would occur if RCRA unit dangerous waste constituents in soil exceed the clean closure performance standards of WAC 173-303-610 (2)(b)(i) but do not exceed MTCA, WAC 173-340-745, Method C cleanup levels. Modified closure would occur under the conditions of the *Hanford Facility RCRA Permit*, Section II.K.D. Postclosure requirements for inspections, maintenance, monitoring, institutional controls, and periodic assessments at the site during a modified closure period would be in accordance with a post closure permit application. This closure plan would be revised to include the conditions of modified closure as stipulated in a postclosure permit application if modified closure occurs. However, the possibility of this tank system requiring modified closure is remote. This is because the unit is an engineered tank system that did not dispose of waste to the soil column or allow tank waste to escape system containment in any significant quantities. Consequently, soil contamination (if any) from RCRA tank system operations is expected to be minimal.

8.1.2 Closure as a Landfill

Landfill closure would be considered if concentrations of RCRA constituents in soil exceed health-based cleanup levels calculated using the Method C formulas of MTCA, WAC 173-340-745. Landfill closure actions would be in accordance with WAC 173-303-610(1)(b) and the Tri-Party Agreement Action Plan (Ecology et al. 1994a).

Landfill closure (if necessary) would not occur until it was determined that soil contamination would not be remediated by the CERCLA 300-FF-2 OU cleanup action to RCRA clean or modified closure standards. Under these

1 conditions, a postclosure plan and postclosure permit application will be
2 prepared for the unit. The postclosure plan will include the following items:

- 3
- 4 • Inspection plan
- 5 • Monitoring plan
- 6 • Maintenance plan
- 7 • Personnel training
- 8 • Postclosure contact
- 9 • Provisions to amend the postclosure plan
- 10 • Provisions to certify the postclosure plan.

11
12 This level of closure is unlikely for the same reasons that modified
13 closure is unlikely, as addressed in Section 8.1.1.

14 15 16 8.2 NOTICE IN THE DEED BOOK

17
18 This closure plan is proposing clean closure of the 300 Area WATS.
19 However, if clean closure cannot be obtained, the following action will be
20 taken in accordance with WAC 173-303-610(1)(b). Within 60 days of the
21 certification of closure, DOE-RL will sign, notarize, and file for recording
22 the notice indicated below. The notice will be sent to the Auditor of Benton
23 County, P.O. Box 470, Prosser, Washington, with instructions to record this
24 notice in the deed book.

25 26 27 TO WHOM IT MAY CONCERN

28
29 The United States Department of Energy-Richland Operations Office, an
30 operations office of the United States Department of Energy, which is a
31 department of the United States government, the undersigned, whose local
32 address is the Federal Building, 825 Jadwin Avenue, Richland, Washington,
33 hereby gives the following notice as required by 40 CFR 265.120 and
34 WAC 173-303-610(10) (whichever is applicable):

- 35
- 36 (a) The United States of America is, and since April 1943, has been in
37 possession in fee simple of the following described lands: (legal
38 description of 300 Area Waste Acid Treatment System).
- 39
- 40 (b) The United States Department of Energy-Richland Operations Office,
41 by operation of the 300 Area Waste Acid Treatment System, has
42 disposed of hazardous and/or dangerous waste under the terms of
43 regulations promulgated by the United States Environmental
44 Protection Agency, and Washington State Department of Ecology
45 (whichever is applicable) at the above described land.
- 46
- 47 (c) The future use of the above described land is restricted under terms
48 of 40 CFR 264.117(c) and WAC 173-303-610(7)(d) (whichever is
49 applicable).
- 50

- 1 (e) The United States Department of Energy-Richland Operations Office
2 has filed a survey plat with the Benton County Planning Department
3 and with the United States Environmental Protection Agency,
4 Region 10, and the Washington State Department of Ecology (whichever
5 are applicable) showing the location and dimensions of the 300 Area
6 Waste Acid Treatment System and a record of the type, location, and
7 quantity of waste treated.

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45 as amended.

46
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48 as amended.

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APPENDIX 2A

PHOTOGRAPHS

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8704683-3CN
(PHOTO TAKEN 1987)

1 Figure 2A-1. 333 Building, Tanks 7 and 11--Chromium (VI) Reduction.

APP F2A-1

95080690-12CN
(PHOTO TAKEN 1995)

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Figure 2A-2. .334-A Building.

95080690-22CN
(PHOTO TAKEN 1995)

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Figure 2A-3. 334-A Waste Acid Storage Tanks--Tanks A,
B, and C (Tank A Out of Service 1988).

8706387-6CN
(PHOTO TAKEN 1987)

Figure 2A-4. 334 Tank Farm Waste Acid Tank 4 (Removed,
Cleaned, and Buried 1988).

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APP F2A-3

APP F2A-4

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Figure 2A-5. 334 Tank Farm.

95080690-9CN
(PHOTO TAKEN 1995)

DOE/RL-90-11, Rev. 1
March 1996

95080690-26CN
(PHOTO TAKEN 1995)

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Figure 2A-6. 313 Building Tank 5.

APP F2A-5

8704479-6CN
(PHOTO TAKEN 1987)

1 Figure 2A-7. 313 Building Waste Acid Neutralization Tank 2.

(PHOTO TAKEN 1975)

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(PHOTO TAKEN 1990)

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Figure 2A-9. 313 Building Effluent Collection Tanks 9 and 10.

APP F2A-8

89050353-15CN
(PHOTO TAKEN 1989)

Figure 2A-10. 313 Building Centrifuge with
Liquid Receiving Tank 11.

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APP F2A-9

89050353-8CN
(PHOTO TAKEN 1989)

89050353-7CN
(PHOTO TAKEN 1989)

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Figure 2A-12. 303 Building Auxiliary Equipment (Pumps, Filters, and Sample Ports).

APP F2A-11

89050353-9CN
(PHOTO TAKEN 1989)

APPENDIX 3A

**KNOWN SPILLS TO 300 AREA WASTE ACID TREATMENT SYSTEM LOCATIONS
PREDATING RCRA OPERATIONS AND FROM NON-300 AREA
WASTE ACID TREATMENT SYSTEM ACTIVITIES**

This appendix contains tables.

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Table 3A-1. Known Spills Predating the 300 Area Waste Acid Treatment System RCRA Operations.
(sheet 1 of 2)

Location	Date	Spill origination point	Material spilled	Chemical constituents	Quantity spilled	Description of event	Cleanup action	Comment
334-A Building	01-30-75	333 Building - chemical bay	Waste etch acids	HNO ₃ , HF and CrO ₃ acids containing copper, uranium, and zirconium in solution	Small quantity	A chemical reaction occurred when a carbonate-bearing waste solution was added to the tanks in the 334-A Building. This caused foaming, which backed up in the drain line from the 333 Building and over-flowed the process tanks, into the process sewer.	Washed foam into process sewer.	Carbonate-bearing solutions were added to system in Tanks 9 and 10 in 313 Building after this incident.
	06-02-78	334-A Building -storage tanks	Waste etch acids	HNO ₃ , HF, H ₂ SO ₄ , and CrO ₃ acids containing copper, uranium, and zirconium in solution	Estimated 18,780 gal of solution (primarily water with some waste etch acids)	Open water fill line in 333 Building caused process tank overflow into the containment pit. The pit when overflowed into the process sewer system. Overflow to the process sewer apparently began at 7:30 a.m. on June 3, and was discovered on the morning of June 5. Due to water input, overflow into the process sewer was primarily water with some acid content (pH 2.6).	Additional solution remaining in the 334-A pit also was drained into the process sewer. (Analysis showed NO ₃ ⁻ [152 ppm ^h]; fluoride [220 ppm]; and copper [220 ppm].	Weekly composite process sewer sample did not indicate increased concentration of F ⁻ , NO ₃ ⁻ , copper, or uranium. Composite pH also was normal. This would imply that release was insignificant in comparison with routine operational releases.
313 Building	12-02-63	313 Building - uranium recovery area	Uranium-bearing acid	HNO ₃ ^a and H ₂ SO ₄ ^b acids containing uranium in solution	Not reported	The 2-in. Saran ^c -lined black iron pipe leaked.	Not reported	The 2-in. Saran-lined black iron pipe from the 333 Building was replaced with acid resistant stainless-steel line.
	1950 to early 1970	313 Building - uranium recovery area	Uranium-bearing acid possibly in neutralized form	HNO ₃ and H ₂ SO ₄ acids containing uranium in solution; NaOH ^d solution when neutralized	Unknown (Substantial)	During repair of a floor in the 313 Building, in early 1970's, solution was found running into a hallway from beneath the acid brick on the floor.	Seeping material was collected and processed through uranium recovery operation.	From recoverable uranium-bearing acid system. Removal of contaminated subfloor was not complete; contamination under repaired floor is still present.

Table 3A-1. Known Spills Predating the 300 Area Waste Acid Treatment System RCRA Operations.
(sheet 2 of 2)

Location	Date	Spill origination point	Material spilled	Chemical constituents	Quantity spilled	Description of event	Cleanup action	Comment
303-F & 311 Tank Farm	1954 to 1986	Caustic storage tanks in 311 Tank Farm	Caustic solution	50% NaOH	Unknown	Tank overflows and minor fitting leaks over the years of use.	None.	Soil around tanks still exhibits high pH necessitating use of chemical resistant suits when excavating in area.
	07-19-63	Pipe trench between 311 Tank Farm and 303-F Building	Uranium-bearing acid	HNO ₃ and H ₂ SO ₄ acids containing uranium in solution	Unknown (Substantial)	The 2-in. Saran-lined black iron pipe leaked into the process sewer. An amount of acid leaking to the process sewer must have been substantial since bottom of concrete trench was severely etched.	Flushed to process sewer.	The 2-in. Saran-lined pipe was replaced with stainless steel in early 1964. The bottom of the pipe trench was relined with concrete in early 1975.
	Prior to 10-74	Process sewer drain from 303-F Building	Caustic solution	NaOH solutions up to 50% concentration	Unknown	In October 1974, it was found that a drain pipe to the process sewer manhole was broken or had dissolved away. From appearances, it had been that way for years.	Replaced damaged pipe.	It is believed that the 50% NaOH solutions had damaged the drain line. The NaOH solutions were routinely discharged from the 303-F Building to the process sewer to keep the 300 Area ponds basic.
334-A Building & 334 Tank Farm	08-01-73	Current site of 334-A Building (before building was constructed)	Waste etch acids	HNO ₃ , HF ^g , and CrO ₃ acids containing copper, uranium, and zirconium in solution	About 1,300 gal.	Failure of the limestone neutralization tank resulted in a discharge to the ground. As a consequence of the tank failure, routine operations involved discharging spent waste acids directly into the process sewer system. This practice continued until January 1975. Because of this leak, the 334-A Building and Tanks A, B, and C were installed in late 1974.	Routed to 300 Area Process Pond for disposal. Added 1,910 lb of NaOH to the tank and allowed this solution to drain out the leak to neutralize the soil.	During construction of the 334-A Building, some of the contaminated soil was removed and disposed of in the 200 Area Burial Ground. The estimated amount is NO ₃ ^{-e} (4,432 lb), F ^{-f} (96 lb), copper (477 lb), and uranium (3 lb).

^aHNO₃ = nitric acid^bH₂SO₄ = sulfuric acid^cSaran is a trademark of Dow Chemical Company.^dNaOH = sodium hydroxide^eNO₃⁻ = nitrate ion^fF⁻ = fluoride ion^gHF = hydrofluoric acid

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Table 3A-2. Known Spills from Non-300 Area Waste Acid Treatment System Activities
in the 300 Area Waste Acid Treatment System Location. (sheet 1 of 4)

Location	Date	Spill Origination point	Material Spilled	Chemical constituents	Quantity spilled	Description of event	Cleanup action	Comment
334 Tank Farm	07-18-75	Sulfuric acid high tank	Acid	90% H_2SO_4^a	About 1,200 gal	A PVC ^b fill line from the sulfuric acid high tank broke in the pipe trench near the tank farm. The acid drained through a limestone pit on the east side of the tank farm into the 618-1 Burial Ground.	The trench was rinsed to the limestone pit. The pipe was repaired.	In 1977, the trench to the limestone pit was blocked and a drain line was installed to the process sewer.
	01-02-81	334 outside storage tank area	Acid	57% HNO_3^c	About 94 gal	Valve was found leaking around packing at the HNO_3 acid storage tank.	Valve packing was tightened, stopping the leak. Washed spill area into process sewer.	Weekly composite process sewer sample showed NO_3^{d-} content of 63.5 ppm ^e . Average value during normal week was 30 ppm. Based on a total process sewer flow of 2,081,400 gal, ~600 lb of HNO_3 could be attributed to the spill. Current CERCLA ^f RQ ^g for HNO_3 is 1,000 lb in a 24-h period.
313 Building	08-19-80	Uranium recovery area	Uranium-bearing acid	HNO_3 and H_2SO_4 acids containing uranium in solution	Unknown	Overflow of storage tank in 313 Building, resulting in an overflow of catch barrel into the process sewer system.	Open valve was closed, stopping overflow. Washed spill area into process sewer.	Weekly composite process sewer sample showed level of 36 ppm NO_3^- and 0.5 ppm uranium. Average of normal operating week was 8 ppm NO_3^- and 0.1 ppm uranium. Using a weekly flow of 102,000 gal, 24 lb of HNO_3 and 0.3 lb of uranium could have been involved in this release. CERCLA RQ for HNO_3 is 1,000 lb; RQ for $\text{UO}_2(\text{NO}_3)_2^h$ is 100 lb.
	06-15-81	Uranium recovery area	Caustic	50% NaOH^i	Unknown	Corroded fill line to Tanks 2 and 6 leaked NaOH to process sewer.	Replaced corroded fill line.	The pH was 11.37 for 313 Building process sewer system.
	09-14-81	Uranium recovery area	Uranium-bearing acid	HNO_3 and H_2SO_4 acids containing uranium in solution	Unknown	Transfer of acid from one storage tank to the other resulted in overflow when the receiving tank level gage failed to operate properly.	Spilled solution was washed into process sewer.	Estimated 2.5 lb of uranium; 11.5 lb of HNO_3 . Estimated release quantities are small compared with current CERCLA RQs of 1,000 lb and 100 lb of HNO_3 and $\text{UO}_2(\text{NO}_3)_2^i$ respectively. an alarm was installed in the catch drum.

Table 3A-2. Known Spills from Non-300 Area Waste Acid Treatment System Activities
in the 300 Area Waste Acid Treatment System Location. (sheet 2 of 4)

Location	Date	Spill Origination point	Material Spilled	Chemical constituents	Quantity spilled	Description of event	Cleanup action	Comment
313 Building (cont)	08-05-82	Uranium recovery area	Uranium-bearing acid	HNO ₃ and H ₂ SO ₄ acids containing uranium in solution	30 gal of acid	In order to provide additional storage capacity, drums were placed in the 313 Building to receive waste acids from the 333 Building. Carbon steel drums were used, which rapidly dissolved and spilled solution into the process sewer.	Solution was flushed into process sewer.	Estimated quantity of uranium (13 lb as UO ₂ (NO ₃) ₂) was well below current CERCLA RQ of 100 lb. Personnel were instructed not to use carbon-steel drums for HNO ₃ - only stainless-steel or plastic drums.
	11-04-82	Uranium recovery area	Degreasing solvent	Perchloroethylene (tetrachloroethylene)	126 gal (approximately)	On 11-03-82, the degreaser solution was drained into the process sewer system during cleanout effort 401.25 liters (106 gallons). On 11-04-82, an additional 76.7 liters (20 gallons) were discharged as a result of the drain valve on the degreaser still being open.	Valve was closed, stopping further release. Floor area was washed into process sewer.	The estimated perchloroethylene release (126 gal) represents about 1,700 lb of material. The current CERCLA RQ for this substance is 1 lb.
	06-30-83	Uranium recovery area	Neutralized uranium-bearing etch solution	NaNO ₃ ^j , Na ₂ SO ₄ ^k , and uranium precipitates	Unknown	Failure of mechanical seal at uranium acid neutralizer tank resulted in release into process sewer.	Neutralizer tank was emptied to prevent further release. Pump was repaired.	The weekly composite process sewer sample showed approximately normal level of F ₋ and copper. Uranium concentration was elevated (1.7 ppm vs 0.03 ppm typically) as was NO ₃ ⁻ (21 ppm vs 6 p/m normally). Based on a total process sewer flow of 296,800 gal, the spill could have involved 4 lb of uranium and 51 lb of NaNO ₃ .
	08-03-84	Uranium recovery area	Neutralized uranium etch solution	NaNO ₃ , Na ₂ SO ₄ , and uranium precipitates	Approximately 10 gal of solution containing about 1 lb of uranium	A pH meter drain valve at the uranium acid neutralization tank was left open, allowing solution to be discharged into the process sewer.	Material on floor, which hadn't reached process sewer, was absorbed. Open valve was closed, stopping discharge.	Quantities of materials involved were well below any CERCLA RQ limits.

Table 3A-2. Known Spills from Non-300 Area Waste Acid Treatment System Activities
in the 300 Area Waste Acid Treatment System Location. (sheet 3 of 4)

Location	Date	Spill Origination point	Material Spilled	Chemical constituents	Quantity spilled	Description of event	Cleanup action	Comment
313 Building (cont)	09-18-84	Uranium recovery area	Degreasing solvent	Perchloroethylene	12 gal	An open valve at the end of an out of service degreaser line released perchloroethylene into a work area in the south east corner of the building. Event occurred when operators pressurized the perchloroethylene pumping line to fill some barrels in the 303-F Building.	Valve was closed, and unused line was removed. Spill was absorbed with pads, collected in containers beneath line, and recovered in sump near line.	No spilled solvent was believed to have entered the process sewer.
	02-77-85	313 Building - process sewer	Uranium-bearing and waste etch acids and neutralized waste	HNO ₃ and H ₂ SO ₄ acids with uranium in solution; and HNO ₃ , HF and CrO ₃ acids with uranium, copper, and zirconium in solution. NaNO ₃ , Na ₂ SO ₄ , NaF, and Na ₂ Cr ₂ O ₇ solution with precipitates of copper, chromium uranium, and zirconium	Unknown	In January 1985, while a new extrusion press was being installed, a leak was discovered in a section of the process sewer line. the leak resulted in a discharge to the ground. It is unknown when the leak started. Spills and routine discharges in the 313 Uranium Recovery Area could have entered this line, resulting in ground disposal of hazardous substances.	None.	The entrances to the leaky section of process sewer were plugged in 1987.
	06-07-86	Uranium recovery area	Caustic solution	25% NaOH	Less than 1 qt.	Failed pump seal in Pump 6 resulted in caustic leak into process sewer over weekend.	Area was flushed into process sewer and pump isolated. Seal was repaired, pump was replaced, and weekend surveillance initiated.	Not a reportable quantity.
303-F Building & 311 Tank Farm	01-12-80	Caustic storage tank in 311 Tank Farm	Caustic solution	50% NaOH	Very small quantity	Condensate from steam heating line in storage tank caused overflow into process sewer.	None. Steam line was shut off to stop discharge.	Less than 1/10 lb of NaOH. Insignificant in comparison with CERCLA RQ of 1,000 lb for NaOH.
	09-22-80	Caustic storage tank in 311 Tank Farm	Caustic solution	50% NaOH	290 gal	A defective valve in the storage tank steam sparge line allowed steam condensate to overflow the storage tank into the process sewer system.	None. A second steam valve was closed, stopping overflow.	Weekly composite process sewer samples showed pH of 11.9. The 290 gal of 50% NaOH corresponds to 1,860 lb (as NaOH). The current CERCLA RQ for NaOH is 1,000 lb.

Table 3A-2. Known Spills from Non-300 Area Waste Acid Treatment System Activities
in the 300 Area Waste Acid Treatment System Location. (sheet 4 of 4)

Location	Date	Spill Origination point	Material Spilled	Chemical constituents	Quantity spilled	Description of event	Cleanup action	Comment
303-F Building & 311 Tank Farm (cont)	01-05-81	Transfer line in trench from 311 Tank Farm to 333 Building	Degreasing solvent	Perchloroethylene	About 116 gal unrecovered	Hose connection in transfer line blew off allowing solvent to drain into railroad underpass. The connection had been improperly installed.	255 gal were removed. The unrecovered solvent evaporated.	No solvent reached the process sewer. The transfer line was removed from service and further solvent transfers from the 311 Tank Farm were done in 55-gal drums.
	09-08-83	303-F Building - caustic mix tank	Caustic solution	NaOH solution	1,200 gal maximum	A slow leak through a water fill valve caused drip overflow of the caustic mix tank in the 303-F Building. The actual cause of the leak was discovered a day after the first indication of high pH in the 313 process sewer system. The weekly sample evidenced a high pH (11.9). Valve was replaced.	None.	A weekly process sewer composite pH indicates a total NaOH release of about 1,200 lb (based upon 462,000 gal total stream flow). This quantity was spread over a few days and appears high when compared with the slow drip nature of the spill. The CERCLA RQ for NaOH is 1,000 lb in a 24-h period.
	02-77-85	Overhead pipe in 311 Tank Farm	Uranium-bearing acid	HNO ₃ and H ₂ SO ₄ acids containing uranium in solution	<10 gal	A leak from the uranium-bearing acid transfer line occurred as a result of a gasket failure caused by freezing of the solution in the line. Analyses showed solution contained NO ₃ ⁻ (3,480 ppm), SO ₄ ⁼ (6,960 ppm), and uranium (920 ppm). Ground beneath showed radioactive contamination from spill.	Some soil was exhumed, packaged, and sent to 200 Area for burial.	Lines above heated pipe trenches were heat taped and insulated.
	11-11-86 and 11-14-86	311 Tank Farm area - pipe trench	Caustic solution	50% NaOH solution	Small quantity	The 313 process sewer pH monitoring system rose to about 10.0 on 11-11-86 and to about 11.0 on 11-14-86, indicating a caustic solution release. Investigation showed that a sump in the 311 Tank Farm (which discharges into the process sewer) contained some caustic material. It appears that material was washed into the sump via rainwater flow through the piping trenches, which contained a small quantity of NaOH from a previous release.	Attempt was made to neutralize solution in sump.	A weekly process sewer composite sample pH was 8.4, compared with an average composite value of about 7.2. This would indicate a NaOH release of <0.1 lb. This quantity is insignificant compared with the CERCLA RQ for NaOH of 1,000 lb. Total weekly process sewer flow was 68,200 lb.

H₂SO₄ = sulfuric acid

PVC = polyvinyl chloride

HNO₃ = nitric acid

NO₃⁻ = nitrate ion

ppm = parts per million

CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act of 1980.

RQ = recordable quantity

UO₂(NO₃)₂ = uranyl nitrate

NaOH = sodium hydroxide

NaNO₃ = sodium nitrate

Na₂SO₄ = sodium sulfate

SO₄⁼ = sulfate ion.

APPENDIX 4A

WASTES PROCESSED THROUGH THE 300 AREA WASTE ACID
TREATMENT SYSTEM PRIOR TO 1980

This appendix contains a table.

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Table 4A-1. Waste Slurry Processed through the 300 Area Waste Acid Treatment System and Discharged to the 183-H Basins Prior to 1980.

Year	Total gallons	Number of loads	Pounds of material							
			Uranium	Chromium	Manganese	Copper	Fluoride ion	Nitrate ion	Sulfate ion	Ammonium ion
1973	19,000	7	40	^a	^a	2,900	^a	26,500	7,500	^a
1974	0	0	--	--	--	--	--	--	--	--
1975	142,000	51	150	130	260	30,300	14,900	160,400	44,900	260
1976	127,000	46	80	270	170	17,700	17,300	168,100	40,800	340
1977	155,000	59	160	160	230	25,700	16,500	200,900	37,300	260
1978	150,000	57	340	110	270	28,400	9,400	154,400	46,400	250
1979	160,000	59	540	190	240	36,800	13,100	166,200	47,100	150
Total	2,542,000 ^b	1,058	4,380	1,640	3,110	436,400	194,800	3,023,400	753,200	3,880

^a Data not available for 1973.

^b Weighted average pH was 9.8.

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APPENDIX 4B

**SUMMARY OF NONROUTINE WASTES TREATED IN THE 300 AREA
WASTE ACID TREATMENT SYSTEM PRIOR TO 1980**

This appendix contains a table.

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Table 4B-1. Summary of Nonroutine Wastes Treated in the 300 Area Waste Acid Treatment System Prior to November 19, 1980. (Sheet 1 of 14)

Waste disposal permit number	Permit date	Material description	Quantity (gal) (lb)		Summary of lab results
1-75	07/21/75	Used sulfamic-acid-based proprietary solution from film developing process	35		pH = 1.7 684 ppm ^a chromium 34 ppm iron 14 ppm aluminum
2-75	12/11/75	Used chromium plating solution	55		Total acid normality = 1.9 >20,000 ppm chromium 2,000 ppm copper 1,000 ppm iron 20 ppm barium 40 ppm cadmium 10 ppm molybdenum
3-75	12/12/75	Synthetic salt solution; Initial makeup was: Sodium hydroxide-13% Sodium aluminate-5% Sodium nitrate-24% Sodium nitrite-8% Water-50%	495		pH = 12.0 Spectrochemical analysis showed no heavy metals
1-76	1/15/76	Unused oxalic acid	70		None
		Formic acid	2		None
2-76	1/15/76	Unused chemicals:			None
		Hydrobromic acid	19		
		Hydroiodic acid	2		
		Perchloric acid	3		
		Phosphoric acid	5		
		Hydrochloric acid	0.5		
		Hypophosphorus acid	1		
4-76	1/19/76	Used absorbing solution containing mercuric chloride (0.067 lb/gal), ethylenediaminetetraacetic acid (0.01 lb total), and potassium chloride (0.05 lb/gal)	20		None

Table 4B-1. Summary of Nonroutine Wastes Treated in the 300 Area Waste Acid Treatment System Prior to November 19, 1980. (Sheet 2 of 14)

Waste disposal permit number	Permit date	Material description	Quantity (gal) (lb)		Summary of lab results
5-76	1/30/76	Used battery acid containing sulfuric acid and lead	240		None
6-76	2/02/76	Used battery acid containing sulfuric acid and lead	140		None
7-76	2/17/76	Used battery acid containing sulfuric acid and lead	52		Approximately 2 lb sulfuric acid/gal 1 ppm lead 2 ppm barium 1 ppm cobalt 5 ppm chromium 2 ppm copper 5 ppm nickel
8-76	2/20/76	Used battery acid containing sulfuric acid and lead	275		None
9-76	3/08/76	Unused oxalic-acid-based proprietary chemicals:			
		Chemical 1	45		10,000 ppm calcium
		Chemical 2	30		500 ppm calcium
					200 ppm sodium
		Chemical 3	26		20,000 ppm sodium
					2,000 ppm calcium
		Chemical 4	6		pH = 4.39
					>5,000 ppm sodium
10-76	3/08/76	Unused ethylenediaminetetraacetic acid-based chemicals:			
		Chemical 1	3		>5,000 ppm sodium
		Chemical 2	3		>5,000 ppm sodium
		Chemical 3	35		50 ppm calcium
		Chemical 4	100		200 ppm sodium
		Chemical 5	25		200 ppm sodium
11-76	3/08/76	Unused chemicals:			
		Sodium hydrosulfite	75		None
		Sodium sulfite	10		None

Table 4B-1. Summary of Nonroutine Wastes Treated in the 300 Area Waste Acid Treatment System Prior to November 19, 1980. (Sheet 3 of 14)

Waste disposal permit number	Permit date	Material description	Quantity (gal) (lb)		Summary of lab results
12-76	3/08/76	Unused phosphoric acid-based proprietary chemicals:			
		Chemical 1	10		2,000 ppm aluminum 2,000 ppm silicon 5 ppm barium 50 ppm iron 50 ppm calcium 200 ppm sodium
		Chemical 2	4		700 ppm aluminum 700 ppm silicon 10 ppm nickel 20 ppm iron 20 ppm calcium 100 ppm sodium
		Chemical 3	4		200 ppm aluminum 700 ppm silicon 40 ppm iron 20 ppm calcium 100 ppm sodium
		Chemical 4	3.5		600 ppm aluminum 600 ppm silicon 20 ppm iron 20 ppm calcium 60 ppm sodium
		Chemical 5	2		600 ppm aluminum 600 ppm silicon 20 ppm iron 20 ppm calcium 100 ppm sodium
		Chemical 6	4		250 ppm aluminum 250 ppm silicon 3 ppm nickel 1 ppm vanadium 5 ppm iron 10 ppm calcium 100 ppm sodium

Table 4B-1. Summary of Nonroutine Wastes Treated in the 300 Area Waste Acid Treatment System Prior to November 19, 1980. (Sheet 4 of 14)

Waste disposal permit number	Permit date	Material description	Quantity (gal) (lb)		Summary of lab results
12-76 (continued)		Chemical 7	5		500 ppm aluminum 250 ppm silicon 5 ppm barium 2 ppm vanadium 2 ppm cobalt 1 ppm molybdenum 5 ppm nickel 10 ppm iron 30 ppm calcium 100 ppm sodium
		Chemical 8	1		200 ppm aluminum 200 ppm silicon 1 ppm barium 1 ppm vanadium 1 ppm nickel 10 ppm iron 10 ppm calcium 100 ppm sodium
		Chemical 9	1		500 ppm aluminum 250 ppm silicon 1 ppm barium 1 ppm vanadium 2 ppm nickel 5 ppm iron 10 ppm calcium 100 ppm sodium
		Chemical 10	1		300 ppm aluminum 300 ppm silicon 1 ppm barium 1 ppm vanadium 3 ppm nickel 5 ppm iron 15 ppm calcium 150 ppm sodium

Table 4B-1. Summary of Nonroutine Wastes Treated in the 300 Area Waste Acid Treatment System Prior to November 19, 1980. (Sheet 5 of 14)

Waste disposal permit number	Permit date	Material description	Quantity (gal) (lb)		Summary of lab results
12-76 (continued)		Chemical 11	4		350 ppm aluminum 350 ppm silicon 2 ppm barium 2 ppm vanadium 3 ppm nickel 7 ppm iron 20 ppm calcium 200 ppm sodium
		Chemical 12	13		1,000 ppm aluminum 1,000 ppm silicon 10 ppm barium 100 ppm iron 30 ppm calcium 300 ppm sodium
		Chemical 13	11		700 ppm aluminum 700 ppm silicon 20 ppm iron 20 ppm calcium 200 ppm sodium
13-76	3/8/76	Unused sulfamic-acid-based proprietary chemicals:			
		Chemical 1	75		100 ppm silicon 50 ppm calcium 10,000 ppm sodium
		Chemical 2	75		20,000 ppm sodium 2,000 ppm calcium
16-76	3/17/76	Used battery acid containing sulfuric acid and lead	107		5.7 normal hydrogen ion 0.2 ppm silver 0.05 ppm chromium 2 ppm lead 2 ppm copper > 100 ppm sodium
17-76	3/17/76	Used battery acid containing sulfuric acid	72		3.0 normal hydrogen ion 0.5 ppm nickel 0.5 ppm lead 1 ppm copper 50 ppm sodium

Table 4B-1. Summary of Nonroutine Wastes Treated in the 300 Area Waste Acid Treatment System Prior to November 19, 1980. (Sheet 6 of 14)

Waste disposal permit number	Permit date	Material description	Quantity (gal) (lb)		Summary of lab results
18-76	3/25/76	Unused chemicals: Nickel plating solution	0.75		pH approximately 7.0 >2% nickel 2,000 ppm boron 10 ppm cobalt 20 ppm copper 40 ppm manganese
		Copper sulfate	4		None
19-76	3/25/76	Unused chemicals: Proprietary solution containing sulfuric acid and nitric acid	5		9.1 normal hydrogen ion 200 ppm copper 20,000 ppm sodium
		Fuming sulfuric acid	1		None
20-76	3/25/76	Unused chromic acid	100		None
21-76	6/29/76	Unused chemicals: Sodium aluminate solution	55		pH = 10.5 1,000 ppm aluminum 40 ppm copper 200 ppm nickel 40,000 ppm sodium 20 ppm iron
		Proprietary caustic materials: Chemical 1 Solution Powder	55	125	pH = 11.8 >100,000 ppm sodium 200 ppm phosphorus 5 ppm lead 2 ppm aluminum 50 ppm calcium
		Aluminum cleaner	400		pH = 11.2 10,000 ppm phosphorus 100,000 ppm sodium

Table 4B-1. Summary of Nonroutine Wastes Treated in the 300 Area Waste Acid Treatment System Prior to November 19, 1980. (Sheet 7 of 14)

Waste disposal permit number	Permit date	Material description	Quantity (gal)	Quantity (lb)	Summary of lab results
21-76 (continued)		All-purpose synthetic cleaner	55		pH = 11.2 1,000 ppm phosphorus 10 ppm copper 6,000 ppm sodium 10,000 ppm silicon 6 ppm iron
		Chemical 2		275	pH = 9.2 10,000 ppm phosphorous >100,000 ppm sodium 20,000 ppm silicon 50 ppm iron 20 ppm aluminum 200 ppm calcium
		Chemical 3		0.25	pH = 12.3 100 ppm aluminum 4 ppm barium 10,000 ppm sodium 1,000 ppm silicon 40 ppm calcium
		Alkaline rust remover		6	5 ppm manganese 100,000 ppm sodium 20 ppm strontium 10 ppm aluminum
22-76	6/29/76	Unused acid-plating solutions:			
		Cobalt plating solution		0.25	pH = 2.3 >20,000 ppm cobalt 200 ppm nickel 2 ppm magnesium
		Activating solution #2		0.25	100 ppm nickel >20,000 ppm sodium 10 ppm cobalt
		Nickel acid solution		0.125	pH = 1.5 30,000 ppm nickel 100 ppm copper 10 ppm manganese 10 ppm chromium 300 ppm cobalt

Table 4B-1. Summary of Nonroutine Wastes Treated in the 300 Area Waste Acid Treatment System Prior to November 19, 1980. (Sheet 8 of 14)

Waste disposal permit number	Permit date	Material description	Quantity (gal) (1b)	Summary of lab results
22-76 (continued)		Activating solution #1	0.25	0.2 ppm nickel 0.1 ppm aluminum 0.1 ppm iron
		Copper acid solution	0.25	pH = 1.1 20,000 ppm copper 20 ppm nickel 10 ppm iron
		Used Zinctone solution containing nitric, sulfuric, and chromic acid	20	None
23-76	6/29/76	Unused chemicals:		
		Copper sulfate	100	None
		Ferric sulfate	2	
		Sodium hypophosphite	0.25	
		Urea	1	
		Vanadium pentoxide	0.25	
		Proprietary solution	0.37	pH = 7.3 >20,000 ppm nickel 10,000 ppm phosphorus 1,000 ppm cobalt 10 ppm chromium
24-76	7/12/76	Caustic materials in drums found onsite (4 drums):		
		Drum 14	55	500 ppm aluminum 500 ppm iron 100 ppm uranium 10 ppm chromium 2,000 ppm calcium 50 ppm strontium 50 ppm nickel 5 ppm lead >100,000 ppm sodium 5 ppm manganese 1 ppm copper 1,000 ppm silicon 10 ppm magnesium

Table 4B-1. Summary of Nonroutine Wastes Treated in the 300 Area Waste Acid Treatment System Prior to November 19, 1980. (Sheet 9 of 14)

Waste disposal permit number	Permit date	Material description	Quantity (gal)	Summary of lab results
24-76 (continued)		Drum 40	39	1,000 ppm aluminum 500 ppm iron 100 ppm nickel 20 ppm strontium 10 ppm chromium 5 ppm manganese 50 ppm barium 100,000 ppm sodium 10 ppm magnesium 200 ppm calcium 100 ppm silicon
		Drum 31	15.5	pH = 8.5 >3,000 ppm copper 30 ppm nickel 6 ppm cadmium 5 ppm aluminum 10 ppm magnesium 300 ppm calcium 60 ppm sodium
		Drum 39	0.5	90 ppm iron 90 ppm manganese 4 ppm chromium 1 ppm nickel 2 ppm barium 900 ppm sodium 40 ppm aluminum 1 ppm magnesium
25-76	7/12/76	Strong acid solution found in drum	1.5	4,000 ppm iron 800 ppm nickel 800 ppm molybdenum 400 ppm copper 80 ppm chromium 40 ppm manganese 40 ppm cobalt 4 ppm vanadium 80 ppm aluminum 8 ppm magnesium
26-76	8/05/76	Used battery acid containing sulfuric acid and lead	60	None

Table 4B-1. Summary of Nonroutine Wastes Treated in the 300 Area Waste Acid Treatment System Prior to November 19, 1980. (Sheet 10 of 14)

Waste disposal permit number	Permit date	Material description	Quantity (gal) (lb)		Summary of lab results
27-76	8/17/76	Unused chemicals:			
		Acetic acid	0.75		None
		Diethanolamine	0.25		None
		Mercuric nitrate	0.125		None
		Sodium hydroxide	0.25		None
		Mercaptoacetic acid	0.125		None
		Choline chloride		2.25	None
		Deoxycholic acid		0.125	None
		Phosphomolybdic acid		1	None
		Sodium chromate		2	None
		Trichloroacetic acid		0.25	None
28-76	8/17/76	Used phosphorus pentoxide desiccant		5	None
29-76	8/17/76	Used ethylenediaminetetraacetic acid solution	185		10 ppm chromium 6,000 ppm copper 6,000 ppm iron 600 ppm manganese 100 ppm molybdenum 1,000 ppm sodium 300 ppm nickel 100 ppm lead 10 ppm zinc 30 ppm aluminum 100 ppm calcium 100 ppm magnesium
30-76	9/2/76	Used hydrochloric acid solution (<1 normal) contains 1 g beryllium	0.25		None
31-76	10/01/76	Sodium nitrate contaminated with dirt		150	None
32-76	10/11/76	Used battery acid containing sulfuric acid and lead	301.5		None

Table 4B-1. Summary of Nonroutine Wastes Treated in the 300 Area Waste Acid Treatment System Prior to November 19, 1980. (Sheet 11 of 14)

Waste disposal permit number	Permit date	Material description	Quantity (gal) (lb)		Summary of lab results
33-76	10/28/76	Used wetting and foaming agent from testing of corrosion rate with uranium; test makeup included 0.003 lb uranium and 0.006 gal wetting and foaming agent	5		None
34-76	12/14/76	Used inhibited hydrochloric acid cleaning solution from derusting of degreasing solvent storage tank; makeup solution of 20% hydrochloric acid and 1% amine-based inhibitor	2,000		None
1-77	1/24/77	Unused 35% hydrogen peroxide solution	6		None
2-77	2/28/77	Unused chemicals: Phosphoric acid	0.25		None
		Acetic acid	2.5		None
3-77	3/01/77	Unused ammonium bifluoride crystals	400		None
4-77	3/07/77	Unused chemicals: Nickel chloride	5		None
		Nickel sulfate	5		None
		Sodium phosphate	1		None
		Sodium borate	1		None
		Boric acid	1		None
		Cupric sulfate	6		None
		Lithium fluoride	1		None
		Aluminum chloride	1		None
		Sodium fluoride	1		None

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Table 4B-1. Summary of Nonroutine Wastes Treated in the 300 Area Waste Acid Treatment System Prior to November 19, 1980. (Sheet 12 of 14)

Waste disposal permit number	Permit date	Material description	Quantity (gal)	Quantity (lb)	Summary of lab results
6-77	3/09/77	Unused chemicals:			
		Ammonium fluoride		4	None
		Sodium fluoride		2.5	None
		Sodium chromate		4	None
		Ammonium citrate		3	None
		Oxalic acid		12	None
		Citric acid		6	None
		Barium perchlorate		4	None
		Ammonium ceric sulfate		4	None
8-77	3/09/77	Unused chromic acid		6	None
11-77	4/13/77	Unused chemicals:			
		Potassium nitrate		2	None
		Potassium dichromate		2	None
		Sodium dichromate		1	None
		Sodium citrate		1	None
		Sodium acetate		1	None
13-77	5/23/77	Used sulfuric acid solution	450		70% sulfuric acid solution; 0.2 ppm silver 10 ppm barium 5 ppm cobalt 100 ppm chromium 30 ppm copper 50 ppm manganese 500 ppm molybdenum 500 ppm nickel 10 ppm lead 5 ppm vanadium 30 ppm iron 10 ppm magnesium 3 ppm titanium 300 ppm zinc
		Used nitric acid solution	50		None
14-77	6/13/77	Unused nickel sulfate solution containing 62 g/L of nickel sulfate	20		None

Table 4B-1. Summary of Nonroutine Wastes Treated in the 300 Area Waste Acid Treatment System Prior to November 19, 1980. (Sheet 13 of 14)

Waste disposal permit number	Permit date	Material description	Quantity (gal)	Quantity (lb)	Summary of lab results
15-77	9/13/77	Unused chemicals:			
		Proprietary alkaline rust remover	440		>100,000 ppm sodium 2,000 ppm calcium 500 ppm iron
		Proprietary chemical (apparently contains sodium bisulfate)	200		>100,000 ppm sodium
		Ammonium persulfate	220		None
		Ethylenediamine	39		None
16-77	9/13/77	Used drum dryer product containing aluminum nitrate and sodium nitrate	400		30,000 ppm aluminum 50,000 ppm calcium 100 ppm copper 3,000 ppm iron 5,000 ppm magnesium 10 ppm manganese 100,000 ppm sodium 10 ppm boron
5-78	5/02/78	Unused proprietary rust prevention material containing sodium nitrite	55		None
6-78	5/08/78	Used absorbing solution consisting of neutral salt mixture of mercuric chloride (10 g/L) ethylenediaminetetraacetic acid (0.07 g/L) and potassium chloride (6 g/L)	10		None
8-78	9/07/78	Used copper strip solution containing depleted uranium	200		0.66 lb/gal nitric acid 1.22 lb/gal copper 0.18 lb/gal uranium 15 ppm cobalt 2 ppm chromium 2 ppm manganese 2 ppm nickel 2 ppm titanium

Table 4B-1. Summary of Nonroutine Wastes Treated in the 300 Area Waste Acid Treatment System Prior to November 19, 1980. (Sheet 14 of 14)

Waste disposal permit number	Permit date	Material description	Quantity (gal) (lb)		Summary of lab results
2-79	1/26/79	Waste nitric acid solution containing depleted uranium	526		111 lb (total) of depleted uranium; 810 lb (total) of nitric acid
4-79	7/05/79	Used derusting solution; prior to neutralization with sodium hydroxide, solution consisted of 2.5% oxalic acid, 3.9 vol% hydrogen peroxide, and 0.01 vol% of concentrated sulfuric acid	165		None
5-79	10/30/79	Unused chromic acid plating solution containing 40 oz/gal chromic acid and 1% sulfuric acid	30		None
6-79	10/30/79	Dilute beryllium sulfate solution containing 10 ppm beryllium sulfate from testing of effects on trout fry and eggs	220		None
8-79	12/13/79	Used copper strip solution containing depleted uranium	300		300 g/L nitric acid 185 g/L copper 14.37 g/L uranium 2 ppm silver 2 ppm manganese

APPENDIX 7A

**QUALITY ASSURANCE PROJECT PLAN FOR SAMPLING AND ANALYSIS FOR
THE 300 AREA WASTE ACID TREATMENT SYSTEM**

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**QUALITY ASSURANCE PROJECT PLAN FOR SAMPLING AND ANALYSIS FOR
THE 300 AREA WASTE ACID TREATMENT SYSTEM⁸**

This quality assurance project plan (QAPjP) has been prepared for regulatory review as part of the *300 Area Waste Acid Treatment System Closure Plan* (DOE 1990) and in support of the sampling and analysis activities described in Section 7.0 of that closure plan. The QAPjP provides the generic quality assurance (QA) and quality control (QC) information for the closure activities defined by the closure plan.

1.0 PROJECT DESCRIPTION

The 300 Area Waste Acid Treatment System is a storage and treatment unit for dangerous waste regulated under the *Washington Administrative Code* (WAC) 173-303, "Dangerous Waste Regulations." The unit is no longer required and will be closed per WAC 173-303.

1.1 PROJECT OBJECTIVES

The sampling and analysis activities at this unit will support the closure activities defined in the unit closure plan. The ultimate goal is the clean closure of the unit.

**1.2 APPLICABILITY AND RELATIONSHIP TO THE ONSITE
CONTRACTOR'S QUALITY ASSURANCE PROGRAM**

This QAPjP applies specifically to field activities and laboratory analyses performed in support of closure of the unit. This QAPjP has been prepared in compliance with the *Environmental Engineering, Geotechnology, and Permitting Function Quality Assurance Program Plan* (WHC 1990a), and the *Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans* (EPA 1980). This QAPjP describes the means selected to implement QA program requirements, defined in the *Quality Assurance Manual* (WHC 1988b), as the requirements apply to environmental investigations. The QAPjP will accommodate the specific requirements for project plan format and content agreed upon in the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) (Ecology et al. 1994).

This QAPjP contains a matrix of procedural resources from *Environmental Engineering, Geotechnology, and Permitting Function Quality Assurance Program Plan* (WHC 1990a) and *Environmental Investigations and Site Characterization Manual* (WHC 1988a). Distribution and revision control of this plan will be

⁸ This is a complete rewrite, revision bars are not used.

carried out in compliance with Quality Requirement (QR) 6.0, "Document Control" (WHC 1988b). All plans and procedures referenced in this QAPjP are available for regulatory review.

2.0 DATA QUALITY OBJECTIVES FOR ANALYTICAL LABORATORY MEASUREMENTS

DQO for a given data collection activity describe the overall level of uncertainty that decision makers are prepared to accept in the analytical results deriving from the activity. Data quality requirements (QR) generally are defined in terms of specific objectives for precision, accuracy, representativeness, comparability, and completeness.

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

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

The method detection limit (MDL) is the minimum concentration of a chemical constituent that can be measured reliably (i.e., it can be reported with 99 percent confidence that the analyte concentration is greater than zero). The MDL is determined from a minimum of seven analyses of samples of a given matrix type (e.g., water, soil, etc.) spiked with the analyte of interest at a concentration three to five times the estimated MDLs. The MDL is the standard deviation of the replicate measurements (reported in concentration units) multiplied by the appropriate Student's t value for the number of replicates taken for a one-tailed test at the 99 percent level of confidence. The practical quantitation limit is defined in *Test Methods for Evaluating Solid Waste* SW-846 (EPA 1990) as the lowest concentration level that can be determined reliably within specified limits of precision and accuracy during routine laboratory operating conditions. Practical quantitation limit values are tabulated in SW-846 for various U.S. Environmental Protection Agency (EPA)-approved analytical methods for evaluating solid waste. The practical quantitation limit values are matrix dependent and method-dependent. Typically, practical quantitation limits are listed as multiples of the MDLs for specified methods and matrix types.

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

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

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

where:

$\bar{x}$ = the arithmetic mean of the x_i measurements
 s = standard deviation.

The relative percent difference (RPD) (EPA 1990) when only two samples are available is:

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

- Accuracy: The closeness of agreement between an observed value and an accepted reference value. When applied to a set of observed values, accuracy will be a combination of a random component and a common systematic error (or bias) component (EPA 1990).
- Completeness: Requirements for precision and accuracy as published in SW-846 and reflected in WHC-SD-EN-SPP-002 (WHC 1993) will be met for at least 90 percent of the total number of determinations on routine samples.

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

Approved analytical procedures will adhere to reporting techniques and units that are consistent with EPA reference methods. This will facilitate the comparability of data sets in terms of precision and accuracy. Actual achieved and/or used detection limits and values for precision, accuracy, and completeness will be provided in all summary analyses reports.

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

Failure to conform to these criteria will be documented in data summary reports (Section 7.1). Corrective actions will be initiated by the Technical Lead as appropriate (Section 12.0) in the event that the criteria initially are not achieved.

3.0 PROCEDURES

Section 3.0 discusses standardized sampling procedures that will be used and the approvals and control of these procedures.

3.1 PROCEDURE APPROVALS AND CONTROLS

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

3.1.1 Hanford Site Procedures

The Hanford Site procedures that have been referenced to support the unit sampling and analysis activities are listed in the QA program index in the *Environmental Engineering, Geotechnology, and Permitting Function Quality Assurance Program Plan* (WHC 1990a). Referenced procedures include Environmental Investigation Instructions (EII) (WHC 1988a) and QR (WHC 1988b). Requirements relating to approval, revision, and distribution control of EIIs are addressed in EII 1.2, "Preparing and Revising of Procedures;" requirements applicable to Quality Instructions (QI) and QRs are addressed in QR 5.0, "Instructions, Procedures, and Drawings," and QR 6.0, "Document Control." Other controlling documents that apply to preparation, review, and revision of Hanford Site analytical laboratory procedures and sample management procedures are identified under Criteria 5.00 and 6.00 in the *Environmental Engineering, Geotechnology, and Permitting Function Quality Assurance Program Plan* (WHC 1990a). All of the aforementioned procedures will be available on request for regulatory review.

3.1.2 Participating Contractor and/or Subcontractor Procedures

Participating contractor and/or subcontractor services may be procured for sampling or technical assistance. All such procurement will be subject to the applicable requirements of QR 4.0, "Procurement Document Control;" QI 4.1, "Procurement Document Control;" QI 4.2, "External Services Control;" QR 7.0, "Control of Purchased Items and Services;" QI 7.1, "Preprocurement Planning and Proposal Evaluation;" and/or QI 7.2, "Supplier Evaluation" (WHC 1988b). Whenever such services require procedural controls, conformance to onsite procedures, or submittal of contractor procedures for onsite review and approval before implementation, the requirement(s) will be identified in the procurement document or work order. Contracting or subcontracting analytical

laboratories will be required to submit their analytical procedures as well as the current version of their internal QA program plans for review and approval. The subject plans and procedures will be reviewed and approved by the Management and Operations (M&O) Contractor's QA, sample management, and analytical laboratories organization personnel, and/or other qualified personnel as determined by the Technical Lead. If required, all reviewers will be qualified per the requirements of EII 1.7, "Qualification and Training" (WHC 1988a). All approved participating contractor or subcontractor procedures, plans, and/or manuals will be retained as project quality records in compliance with the *Document Control and Record Management Manual*, Section 9.0 (WHC 1989); QR 17.0, "Quality Assurance Records;" and QI 17.1, "Quality Assurance Records Control" (WHC 1988b). All such documents will be available upon request for regulatory review.

3.2 SAMPLING PROCEDURES

As a minimum, sampling procedures will follow the guidelines and requirements of SW-846 (EPA 1990). Soil samples will be collected in compliance with EII 5.2, "Soil and Sediment Sampling" (WHC 1988a).

Where no standardized procedures for sampling or analysis exist (e.g., the sampling and analysis of asphalt or concrete), the best practice will be followed in collection and analysis of these samples. Specific sampling and analytical methodologies will be determined in concert with the appropriate regulatory agencies and documented in the unit closure plan, unit SAP, or other appropriate document.

Sample numbers will be assigned as indicated in EII 5.10, "Obtaining Sample Identification Numbers and Accessing HEIS Data" (WHC 1988a). Sampling activities will conform with the sample identification, container type, preparation, and preservation requirements of EII 5.11, "Sample Packaging and Shipping" (WHC 1988a).

3.3 PROCEDURE ADDITIONS AND CHANGES

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

4.0 SAMPLE CUSTODY

All samples obtained during the course of this investigation will be controlled from the point of origin to the analytical laboratory as stipulated in EII 5.1, "Chain of Custody" (WHC 1988a). Chain-of-custody documentation also will be maintained for the return of residual sample materials from the laboratory. Requirements and procedures will be defined in procurement documentation to subcontractor or participant contractor laboratories for the return of residual sample materials after completion of analysis. Laboratory chain-of-custody procedures will ensure that sample integrity and identification are maintained throughout the analytical process and will be reviewed and approved in advance as required by onsite procurement control procedures (see Section 3.1.2).

Analytical results will be traceable to the original samples through a unique code or identifier (see Section 3.0). All analytical results will be controlled as permanent project quality records as required by QR 17.0, "Quality Assurance Records" (WHC 1988b), and EII 1.6, "Records Processing" (WHC 1988a).

Sample and/or data flow will be coordinated by the sample management organization. The sample management organization will be responsible for tracking, controlling, and verification of in-process samples and data per the *Sample Management And Administrative Manual*, WHC-CM-5-3, Section 1.0, "Sample Tracking;" Section 1.3, "Data Package Control;" and Section 1.1, "Data Package Verification" (WHC 1990b).

All samples will be screened in the field for beta/gamma and gross alpha radioactivity in compliance with approved Hanford Site health physics procedures (WHC 1990c). Health physics technicians must release samples before the samples can be transported to offsite laboratories for analysis of dangerous constituents.

5.0 CALIBRATION PROCEDURES

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

6.0 ANALYTICAL PROCEDURES

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

7.0 DATA REDUCTION, VALIDATION, AND REPORTING

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

7.1 DATA REDUCTION AND DATA PACKAGE PREPARATION

When each group of analyses is completed, the analytical laboratory will prepare a report summarizing the analytical results. The analytical laboratory also will prepare a detailed data package. The data package will include all information necessary to perform data validation to the extent indicated by the minimum applicable requirements (Section 7.2). Data summary report format and data package content will be defined in procurement documentation subject to review and approval (see Section 3.1). As a minimum, laboratory data packages will include the following:

- Sample receipt and tracking documentation. This will including identification of the organization and individuals performing the analysis, the names and signatures of the responsible analysts, sample holding time requirements, references to applicable chain-of-custody procedures, and the dates of sample receipt, extraction, and analysis.
- Instrument calibration documentation. This will including equipment type and model, with continuing calibration data for the time period in which the analyses were performed.
- QC data. This will include QC data appropriate for the methods used. This can including matrix-spike/ matrix-spike duplicate data, recovery percentages, precision data, laboratory blank data, and identification of any nonconformances that might have affected the laboratory's measurement system during the time in which the analyses were performed.
- Analytical results or data deliverables. This will include reduced data, reduction formulas or algorithms, and identification of data outliers and/or deficiencies.

Other supporting information (e.g., initial calibration data, reconstructed ion chromatographs, spectrograms, traffic reports, and raw data) are included in the individual data packages. All sample data, will be retained by the analytical laboratory and made available for systems or program audit purposes at the request of the M&O contractor, U.S. Department of Energy (DOE), or regulatory agency representatives (Section 9.0). Such data will be retained by the analytical laboratory through the duration of the contractual statement of work, at which time the data will be transmitted for archiving.

1 A completed data package will be reviewed and approved by the analytical
2 laboratory QA manager before the package is submitted to the sample management
3 organization for validation.
4

5 The requirements of Section 7.1 will be included in procurement documents
6 and/or work orders, as appropriate, in compliance with the procurement control
7 procedures (Section 3.1).
8
9

10 7.2 VALIDATION

11
12 Data validation of the completed laboratory data packages and the
13 reporting of the results of the validation process will be performed in
14 conformance with requirements and procedures identified in *Sample Management*
15 *and Administrative* (WHC 1990b), and the *Data Validation Procedures for*
16 *Chemical Analyses* (WHC 1993). Data validation will be to a minimum of Level C
17 as outlined in variation procedures (WHC 1993). Data validators will perform
18 a number of tasks on each sample delivery group in response to general and
19 specific requirements identified in the data validation procedures (WHC 1993).
20 A sample delivery group is defined as a group of samples (usually 20 or fewer)
21 reported within a single laboratory data package. These tasks are summarized
22 as follows:
23

- 24 • Take delivery of the data package, stamp the receipt date on the
25 package, and make duplicate copies of the sample concentration
26 reports or report forms
27
- 28 • Organize and review the data package for completeness, as described
29 in the data validation procedures (WHC 1993), and document the
30 completeness review on the applicable data validation checklist
31
- 32 • Validate the data package and qualify sample results according to
33 the procedures and criteria described in the data validation
34 procedures (WHC 1993). Data that are rejected at any point during
35 validation will be eliminated from further review or consideration
36
- 37 • Check for calculation and transcription errors, applying the
38 frequency guidelines (Section 7.2.1)
39
- 40 • Resolve any discrepancies identified during the review of the data
41 package, including any missing data, with the laboratory
42
- 43 • Prepare a narrative summary of the acceptability of the data, and
44 prepare a summary of the validated results in tabular and electronic
45 formats after the data have been validated
46
- 47 • Submit the data validation report. The report will include the
48 narrative summary, an electronic media copy of the data, checklists,
49 summary forms, and the qualified laboratory concentration reports to
50 the Technical Lead within 21 days after receipt of the data package
51 from the laboratory.
52

7.2.1 Frequencies for Checking Calculation and Transcription Errors

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

- Investigative samples and verification samples. All reported laboratory results for at least 20 percent of the samples contained in the sample delivery group and 100 percent of the reported QC samples (duplicates, matrix spikes, field blanks, and any performance audit samples) will be recalculated and verified against the instrument printouts and bench sheet records (raw data). If possible, at least 50 percent of the samples selected for recalculation should contain positive results for the compounds analyzed.
- Confirmatory samples. All reported laboratory results for 100 percent of the samples contained in the sample delivery group and 100 percent of the reported QC samples (duplicates, matrix spikes, field blanks, and any performance audit samples) will be calculated and verified against the raw data.

Reporting requirements for validation of data produced by routine and special analytical methods other than EPA reference methods (EPA 1990) will be established within applicable procedures for the individual methods, subject to review and approval (see Section 3.1). The reporting requirements will be in general compliance with the guidelines provided previously in Section 7.2.

7.3 FINAL REVIEW AND RECORDS MANAGEMENT CONSIDERATIONS

All validation reports and supporting analytical data packages will be subjected to a final technical review by a qualified reviewer at the direction of the Technical Lead before submittal to regulatory agencies or inclusion in reports or technical memoranda. All validation reports, data packages, and review comments will be retained as permanent project quality records in compliance with *Document Control and Records Management Manual*, Section 9.0 (WHC 1989), and QR 17.0, "Quality Assurance Records" (WHC 1988b).

8.0 INTERNAL QUALITY CONTROL

All analytical samples will be subject to in-process QC measures both in the field and in the laboratory. The following types of control samples are specified in the unit SAP to maintain internal QC.

- Duplicate Samples--Field duplicate samples are samples retrieved from a single sampling location using the same equipment and sampling technique but analyzed independently. Duplicate samples generally are used to assess sampling precision.

- Trip Blanks--A trip blank consists of a sample container of an appropriate media (e.g., pure silica sand or deionized water) that is prepared in the laboratory, transported to the sampling site, and returned unopened for analysis with the actual samples. Analysis of the trip blank will eliminate false positive results for the actual samples arising from contamination during shipment.
- Equipment Blanks--An equipment blank consists of an appropriate media (e.g., pure silica sand or deionized water) that is drawn through decontaminated sampling equipment and placed in a container identical to those used for the actual field samples. Equipment blanks are used to verify the adequacy of the decontamination procedures for sampling equipment.

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

- Duplicates or Matrix-Spiked Duplicates--Estimate analytical precision.
- Matrix-Spiked Samples--A known quantity of a representative analyte of interest is added to an aliquot (or a replicate) of an actual sample and analyzed to measure the recovery percentage. Spike compound selection, quantities, and concentrations will be described in the laboratory's analytical procedures.
- Laboratory QC Samples--A QC sample is prepared from an independent standard at a concentration within the calibration range. Reference samples provide an independent check on analytical instrument calibration.

The numbers and/or frequencies of QC samples to be submitted and analyzed with each group of samples are specified in the analytical contract. The numbers of QC samples proposed in the sampling plan have been determined based on guidance presented in SW-846 (EPA 1990) and the discussion during the meetings between the M&O Contractor, DOE, and regulatory agencies during the DQOs process.

Detailed descriptions of internal QC requirements for participating contractor or subcontractor laboratories will be provided in procurement documents or work orders in compliance with standard procedures (see Section 3.1).

9.0 PERFORMANCE AND SYSTEM AUDITS

Performance, system, and program audits will begin early in the execution of this sampling plan and continue through completion of activities. Collectively, the audits will address quality-affecting activities that include, but are not limited to, measurement accuracy; intramural and

extramural analytical laboratory services; field activities; and data collection, processing, validation, and management.

Regarding offsite contractor laboratory analyses of confirmatory samples, performance audits of analytical accuracy will be implemented through the use of QA and QC samples.

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

Sampling plan activities could be evaluated as part of environmental restoration program-wide QA audits under procedural requirements. Program audits will be conducted in accordance with QR 18.0, "Audits," and QI 18.1, "Audit Programming and Scheduling" (WHC 1988b).

10.0 PREVENTIVE MAINTENANCE

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

11.0 DATA ASSESSMENT

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

12.0 CORRECTIVE ACTION

Corrective actions required as a result of surveillance reports, nonconformance reports, or audit activities will be documented and dispositioned as required by QR 16.0, "Corrective Action"; QI 16.1, "Trend Analysis"; and QI 16.2, "Corrective Action Requests" (WHC 1988b). Primary responsibilities for corrective action resolution will be assigned to the Technical Lead and the quality assurance coordinator. Other needs for corrections to measurement systems, procedures, or plans that are identified as a result of routine review processes will be resolved as stipulated in applicable procedures or referred to the Technical Lead for resolution. Copies of all surveillance, nonconformance, audit, and corrective action documentation will be retained as project quality assurance records.

13.0 QUALITY ASSURANCE REPORTS

Project activities will be assessed regularly by audit and surveillance processes (see Sections 9.0 and 12.0). At the conclusion of a given sampling and analysis project, all related field and laboratory data, raw data, reports, surveillance reports, nonconformance reports, audit reports, and corrective action documentation will be transferred for archival to the Hanford Site Records Holding Area (if documentation has not been transmitted previously). In the event that original quality-affecting documents are to be retained and/or controlled by others, legible copies will be transmitted to the Records Holding Area for inclusion in the project record file.

14.0 REFERENCES

14.1 DOCUMENTS

- DOE, 1990, *300 Area Waste Acid Treatment System Closure Plan*, DOE/RL-90-11, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
- Ecology, EPA, and DOE, 1994, *Hanford Federal Facility Agreement and Consent Order*, 2 vols, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington.
- EPA, 1980, *Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans*, EPA-QAMS-005/80, U.S. Environmental Protection Agency, Washington, D.C.
- EPA, 1990, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods*, SW-846, Supplement 1990, U.S. Environmental Protection Agency, Washington, D.C.
- WHC, 1988a, *Environmental Investigation and Site Characterization Manual*, WHC-CM-7-7, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1988b, *Quality Assurance Manual*, WHC-CM-4-2, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1989, *Document Control and Records Management Manual*, WHC-CM-3-5, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1990a, *Environmental Engineering, Geotechnology, and Permitting Function Quality Assurance Program Plan*, WHC-EP-0330, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1990b, *Sample Management and Administrative Manual*, WHC-CM-5-3, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1990c, *Health Physics Procedures Manual*, WHC-IP-0692, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1993, *Data Validation Procedures for Chemical Analyses*, WHC-SD-EN-SPP-002, Rev. 2, Westinghouse Hanford Company, Richland, Washington.

14.2 CODE OF FEDERAL REGULATIONS AND FEDERAL REGISTER

None.

1 14.3 FEDERAL AND STATE ACTS

2
3 None.

4
5
6 14.4 WASHINGTON ADMINISTRATIVE CODE AND REVISED CODE OF WASHINGTON

7
8 WAC 173-303, *Dangerous Waste Regulations*, Washington State Department of
9 Ecology, Olympia, Washington.
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APPENDIX 7B

TRAINING COURSE DESCRIPTIONS

This appendix contains a training matrix and brief course descriptions.

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Table 7B-1. Training Requirements for RCRA Closure
Plan Activities. (Sheet 1 of 2)

	Course Name/Number	Description
1.	Hanford General Employee Training/#000001	Course provides a refresher overview of the Federal and applicable hazard communication programs and hazardous and/or dangerous waste disposal programs for all Hanford employees.
2.	Hazard Communication and Waste Management Awareness/#02006G	Course provides the hazardous and/or dangerous material/waste worker who generates dangerous or mixed waste with the fundamentals for use and disposal of hazardous and/or dangerous materials.
3.	Unit-specific contingency plan/hazard/communication/emergency preparedness/#03E972	Course(s) provides specific information on hazardous and/or dangerous chemicals and waste management at the employees' treatment, storage, and/or disposal (TSD) unit.
4.	Advanced Course 2 - Hazardous Waste Shipper Certification/#020159	Course provides an indepth look at federal, state, and Hanford Site requirements for nonradioactive hazardous and/or dangerous waste management and transportation.
5.	Waste Designation/#035010	Course teaches dangerous waste designation per WAC 173-303.
6.	Facility Waste Sampling and Analysis/#035020	Course presents waste sampling methodologies according to EPA Protocols SW-846, Test Methods for Evaluating Solid Waste Physical/Chemical Methods. Course also addresses sampling plan, field and laboratory quality assurance/quality control (QA/QC) and use of sampling equipment.
7.	Core Waste Management Training/#035100 (Requalification #035110)	Course covers general training requirements for waste management in containers at 90-day accumulation areas and TSD units.
8.	Waste Management Administration/#035120 (Requalification #035130)	Course is designed for personnel who work with the administrative aspects of dangerous an/or mixed waste management and covers regulatory and company policies, forms, reports, forecasts and plans.

Table 7B-1. Training Requirements for RCRA Closure
Plan Activities. (Sheet 2 of 2)

	Course Name/Number	Description
1	9. Building Warden Training/#037500 (Requalification #037510)	Course provides an overview of the responsibilities of the building warden and identifies building emergency organizations, emergency actions, implementing the contingency plan, and drill and exercises requirements.

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APPENDIX 7C

TANK 2 SAMPLING RESULTS

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Battelle

Pacific Northwest Laboratories
Battelle Boulevard
P.O. Box 999
Richland, Washington 99352
Telephone (509)

376-9454

February 7, 1996

James W. Rich
Westinghouse Hanford Company
P.O. Box 1970 L6-26
Richland, WA 99352

Dear Jim,

The analytical work has been completed per your letter of instruction, LOI ED6202-1 "Sludge recovery area, building 313 tank samples analysis". Attached are the final reports for metals by ICP, pH, total alpha activity, total beta activity, and gamma energy analysis (GEA). The analytical results are summarized in Table 1. As can be seen from the radiochemistry results, the only radionuclides detected by GEA were ^{235}U and ^{238}U . Although the uranium results for some of the samples are near the ICP detection limit, the ICP uranium results compare reasonably well with the uranium concentration calculated from radiochemistry GEA results. Therefore, uranium by laser fluorimetry was not performed.

Although the LOI indicated that the analytical results were to provide verification of process knowledge, and were not to be used for RCRA designation of the material, it should be noted that two analytes (Cr and Pb) which are used to designate waste as hazardous were found at elevated levels in most of the samples (i.e., all samples except 3C95159-01). If these samples were subjected to a toxic characteristic leach procedure (TCLP) and the Cr and/or Pb in the samples leached, the waste would be considered toxic and hazardous. For reference, if the Cr (or Pb) concentration was only 100 $\mu\text{g/g}$ and all the Cr (or Pb) leached during the TCLP, the samples would be hazardous. The Cr in samples 3C95159-02 through 3C95159-09 ranges from about 100 $\mu\text{g/g}$ to 8000 $\mu\text{g/g}$. Although only a fraction of the Cr (or Pb) may be leachable following the TCLP, until the TCLP analysis is performed, the waste should be considered hazardous.

Also, per our discussions the samples were digested for analysis by a method PNL-ALO-129 "HNO₃-HCL Acid Extraction of Solids using a Dry-Block Heater"; this method is technically equivalent to the solids digestion method contained in EPA SW-846. These methods are specifically designed to extract EPA metals of interest, but may not provide full dissolution of the sample matrix. For instance, silicates are typically only partially digested and the method may not provide total digestion for many geochemical phases. Typically, about 5% to 10% residuals remain after extraction/digestion by this method. Two samples, 3C5159-03 and 3C5159-08, had significantly higher residuals than normal (i.e., 95% and 85%,

respectively) following the acid dissolution procedure. Based on this, samples demonstrating less than 90% dissolution were reanalyzed by ICP following a caustic fusion dissolution. The ICP results in Table 1 represent the results obtained from the fusion dissolution where performed; otherwise, the ICP results are from the original acid dissolution.

Table 2 summarizes the methods used to perform the requested analyses. It should be noted that the GEA was performed directly on the sample material and that the pH was measured following a 1:1 dilution with water. The initial ICP reports and radiochemistry report are provided in Attachment 1 through Attachment 3. The attachments provide additional information on the precision and accuracy of the analytical results (e.g., quality control results) and the location of the analytical records (e.g., project file 20063-ED6202 or ICP system file ICP-325-405-1).

Should you have any question please contact me on 376-9454.

Sincerely,

A handwritten signature in cursive script, reading "Michael W. Urie".

Michael W. Urie
Analytical Chemistry Laboratory

Description of Tank Samples

<u>Sample Number</u>	<u>Tank Number</u>	<u>Description of Sample</u>
3C95159-01	Tk-6	White "gummy" material with hard white/yellow crust taken near the center of tank, 36 grams.
3C95159-02	Tk-7	Single aquae colored crystal taken from the bottom of the tank halfway between the center and the South-East tank wall, 0.4 grams.
3C95159-03	Tk-4	Light ash like material, grey/black color, taken near center of tank, 65 grams.
3C95159-04	Tk-4	Yellow crystals, taken from tank bottom near North-West tank wall, 2.5 grams
3C95159-05	Tk-5	Sand like material, grey/black color, taken from bottom of tank near center, 7.1 grams
3C95159-06	Tk-5	Sand like material, grey/black color, taken from bottom of tank near tank wall, 14 grams
3C95159-07	Tk-5	Light beige crystals, taken from tank bottom half way between the center and the South-East tank wall, 11.1 grams
3C95159-08	Tk-3	Light beige powder, taken near center of tank, only a very small sample could be obtained.
3C95159-09	TK-2	Light ash like material, grey/black color, taken near center of tank, 27 grams.

Table 1: 313 Building Tank Samples Analysis Summary

DOE/KL-90-11, Rev. 1
March 1966

Sample Suffix Lab #96- %Soluble		SAMPLES: 3C95159-								
		01	02	03	04	05	06	07	08	09
		01699	01700	01701	01702	01703	01704	01705	01706	01707
		~91%	~94%	~98%	~98%	~98%	~93%	~95%	~99%	~99%
Prep: Acid Digest or Fusion		Acid	Acid	Fusion	Fusion	Fusion	Acid	Acid	Fusion	Fusion
ICP (µg/g)	Al	(115)	3440	10200	6060	11040	1050	1130	34000	4280
	Ba	n/d	n/d	(30)	(40)	(100)	(60)	(50)	170	(50)
	Ca	860	(350)	2700	9380	9240	1230	1240	2930	4660
	Co	n/d	n/d	(170)	350	n/d	n/d	n/d	(190)	(30)
	Cr	(10)	3030	16800	11400	410	140	120	25300	6700
	Cu	(25)	5130	(360)	2860	8030	5690	2130	780	20500
	Fe	3650	2660	68500	66300	17400	4420	3690	96700	53300
	K	n/d	n/d	n/d ⁽¹⁾	(900) ⁽¹⁾	3400 ⁽¹⁾	(700)	(550)	(820) ⁽¹⁾	(1760) ⁽¹⁾
	Mg	(140)	1540	(1100)	(2800)	(2800)	(290)	(250)	5090	(1100)
	Mn	(50)	(250)	1980	1130	360	(50)	(50)	2300	850
	Mo	n/d	n/d	1160	1900	n/d	n/d	n/d	4750	n/d
	Na	319000	190000	5020	23100	223000	268000	268000	7840	236000
	Ni	n/d	2470	2030 ⁽¹⁾	10300 ⁽¹⁾	(90) ⁽¹⁾	n/d	n/d	730 ⁽¹⁾	(270) ⁽¹⁾
	P	n/d	(370)	(580)	(1270)	(390)	n/d	n/d	(570)	(320)
	Pb	n/d	n/d	n/d	(900)	(400)	(240)	(90)	(3360)	(120) ⁽¹⁾
	Si	370	1250	420000	89300	39000	(1000)	(1500)	193000	20300
	Sr	(20)	n/d	n/d	(60)	(60)	n/d	n/d	(50)	(50)
	Ti	n/d	n/d	660	510	1250	(70)	n/d	3540	430
	U	(590)	(1700)	(630) ⁽¹⁾	(17300)	(740) ⁽¹⁾	(490)	(240)	1300 ⁽¹⁾	(3300)
	Zn	n/d	(230)	(60)	710	250	(90)	(180)	(300)	(140)
	Zr	(75)	1480	5530	1310	(1020)	590	(220)	7390	15200
Prep: Water Leach		Water	Water	Water	Water	Water	Water	Water	Water	Water
pH		> 13 ⁽²⁾	n/m ⁽⁴⁾	1.4	< 1 ⁽³⁾	9.2	9.3	9.3	n/m ⁽⁴⁾	10.1
Prep: Acid Digest		Acid	Acid	Acid	Acid	Acid	Acid	Acid	Acid	Acid
Total Alpha (pCi/g)		550	940	650	8430	430	400	140	1100	680
Total Beta (pCi/g)		350	1180	480	7000	430	300	140	1260	930
Digest: None (Direct)		Direct	Direct	Direct	Direct	Direct	Direct	Direct	Direct	Direct
GEA (pCi/g)	²³⁵ U	12.8	28.1	23.2	245	2.5	1.7	3.8	36.9	21.2
	²³⁸ U	260	650	380	4600	46	35	94	540	970
(µg/g)		U [Total] ⁽²⁾	780	1950	1130	13800	140	100	280	2880

Notes: ⁽¹⁾ Values are from Acid Digestion results⁽²⁾ Uranium concentration is calculated from GEA results using specific activities of ²³⁵U and ²³⁸U.⁽³⁾ Measured pH outside reportable range 1 to 13 pH units.⁽⁴⁾ Not Measured (n/m): Insufficient sample provided to laboratory to perform water leach and pH measurement.

n/d = not detected; see Attachment 1 and Attachment 3 for detection limits.

() = Values in parentheses are for information only; value are above detection limit but below quantitation limit.

Table 2: 313 Building Tank Sample Analysis Procedure Summary

Method	Procedure Number	Description
ICP	PNNL-ALO-211	Determination of Elements by Inductively Coupled Argon Plasma Atomic Emission Spectrometry
Total Alpha	PNNL-ALO-420	Solution Analysis: Preparation of Alpha Sources by Direct Evaporation
	PNNL-ALO-421	Total Alpha Counting and Analysis
Total Beta	PNNL-ALO-430	Solution Analysis: Preparation of Beta Sources by Direct Evaporation
	PNNL-ALO-431	Total Beta Counting and Analysis
GEA	PNNL-ALO-450	Gamma Energy Analysis (GEA) and Low-Energy Photon Spectrometry (LEPS)
pH	PNNL-ALO-290	Determine of pH in Soil Samples
Fusion Prep	PNNL-ALO-115	Solubilization of Metals from Solids Using a KOH-KNO ₃ Fusion
Acid Prep	PNNL-ALO-129	HNO ₃ -HCl Acid Extraction of Solids Using a Dry-Block Heater

ATTACHMENT "1"

INDUCTIVELY COUPLED PLASMA SPECTROMETER

"ACID DIGESTION" ANALYTICAL RESULTS

**Battelle PNNL/ACL/Inorganic Analysis Group:
ICPAES Analytical Report**

WO/Project: ED6202/20063
Client: JW Rich
Impact Level: I

ACL Nmbr(s): 96-001699 through 96-001707

Client ID: "3C95159-01" through "3C95159-09"

ASR Nmbr 2686

Total Sample(s): 9

Procedure: PNNL-ALO-211, "Determination of Elements by Inductively Coupled
Argon Plasma Atomic Emission Spectrometry" (ICP-AES).

Analyst: DR Sanders

Analysis Date (Filename): 12/20/95 (A0044)

See ALO System File: "ICP-325-405-1" for traceability to Calibration,
Quality Control, Verification, and Raw Data.

M&TE Number: ICPAES instrument -- WB73520
Mettler AT400 Balance -- Ser.No. 360-06-01-029

12-21-95
Reviewed by

12/21/95
Concur

12/21/95

**Battelle PNNL/ACL/Inorganic Analysis Group:
ICPAES Analytical Report**

Nine radioactive sediment samples and a process blank were prepared by the 325 SAL-SRPL lab. for ICPAES analysis using PNL ALO-129 Procedure (acid digestion using HNO₃/HCl). An aliquot weight of approximately 0.8 grams was used for each sample prepared. Final sample volume after digestion was adjusted to 25 mL. Most of the sediment (sample) dissolved but not all. Each sample solution was filtered to remove the insoluble residue. Analytical dilution of 2 fold and in some cases 10 and 20 fold dilution was necessary in order to measure the very high concentrations of several analytes (e.g. Cr, Cu, Fe and Na) by ICPAES.

Analysis indicated several samples had very high concentrations of Chromium (0.8 wt%), Copper (2.4 wt%), Iron (5.5 wt%), Nickel (1.0 wt%), Lead (0.29 wt%), Sodium (26.8 31.9 wt%), and Uranium (1.2 wt%). Other analytes were present but in lower concentration. *measured 12/22/95*
The measurement uncertainty for analytes shown in brackets may be higher than normal due to the interference effects from high concentrations of Chromium, Iron, Nickel and Uranium.

Sample 96-001699 was post-spiked with all of the analytes measured by ICPAES analysis (except Na and K). Three separate reagent solutions were needed to prepare the post-spike samples. All post-spike analytes were recovered within acceptable tolerance (85% to 115%).

A duplicate sample aliquot was prepared (96-001707) and analyzed. Duplicates varied from approximately $\pm 10\%$ RPD for Al and Na, to $\pm 38\%$ RPD for Cr (Relative Percent Difference).

Attached is an "ICPAES Data Report" for sample measurement results, detection limits, and etc. All results have been corrected for sample processing including analytical dilution. Please note, bracketed values listed in the data report are within ten times instrument detection limit. Those measurement values have a potential uncertainty much greater than 15%.

12/21/95

**Battelle PNNL/ACL/Inorganic Analysis Group:
ICPAES Analytical Report**

Comments:

- 1) "Final Results" have been corrected for all laboratory dilutions performed on the sample during processing and analysis.
- 2) Detection limits (DL) shown are for acidified water. Detection limits for other matrices may be determined if requested.
- 3) Routine precision and bias is typically $\pm 15\%$ or better for samples in dilute, acidified water (eg. 2% v/v HNO₃ or less) at analyte concentrations greater than ten times detection limit up to the upper calibration level. This also presumes that the total dissolved solids concentration in the sample is less than 5000 mg/mL (0.5 per cent by weight).
- 4) Absolute precision, bias and detection limits may be determined on each sample if required by the client.
- 5) The maximum number of significant figures for all ICP measurements is 2.
- 6) To convert "WT%" to "mg/Kg" or " $\mu\text{g/g}$ ", multiply concentration value by 10,000.
- 7) To convert "mg/Kg" or " $\mu\text{g/g}$ " to "WT%", divide concentration value by 10,000.

12/21/95

Det. Limit (ug/mL)	Multiplier= ALOH= Client ID= Run Date= (Analyte)	32.2 PREP BLANK 12/20/95 ug/g	68.9 96-001699 @2 3C95159-01 12/20/95 ug/g	136.5 96-001700 @2 3C95159-02 12/20/95 ug/g	57.8 96-001701 @2 3C95159-03 12/20/95 ug/g
0.500	Ag	--	--	--	--
1.000	Al	--	[115.29]	3436.81	[108.40]
1.000	As	--	--	--	--
0.500	B	[74.64]	[82.82]	[174.44]	[53.36]
0.500	Ba	--	--	--	--
0.100	Be	--	--	--	--
1.000	Bi	--	--	--	--
1.000	Ca	--	863.40	[348.81]	[176.05]
0.100	Cd	--	--	--	--
1.000	Ce	--	--	--	--
1.000	Co	--	--	--	--
0.100	Cr	--	[12.06]	3033.43	2822.55
0.100	Cu	[3.93]	[25.38]	5132.34	178.67
1.000	Dy	--	--	--	--
1.000	Eu	--	--	--	--
0.050	Fe	--	3654.51	2663.58	11971.93
5.000	K	--	--	--	--
1.000	La	--	--	--	--
1.000	Li	--	--	--	--
1.000	Mg	--	[140.22]	1539.58	[109.25]
0.500	Mn	--	[53.47]	[249.22]	[219.57]
1.000	Mo	--	--	--	[133.07]
5.000	Na	--	319000	190000	[744.49]
1.000	Nd	--	--	--	--
1.000	Ni	--	--	2466.21	2030.38
1.000	P	--	--	[371.08]	--
1.000	Pb	--	--	--	--
5.000	Pd	--	--	--	--
1.000	Rh	--	--	--	--
10.000	Ru	--	--	--	--
1.000	Sb	--	--	--	--
2.000	Se	--	--	--	--
5.000	Si	--	[366.21]	[1248.65]	--
10.000	Sn	--	--	--	--
0.100	Sr	--	[15.70]	--	--
5.000	Te	--	--	--	--
5.000	Th	--	--	--	--
1.000	Ti	--	--	--	--
5.000	Tl	--	--	--	--
1.000	U	--	[593.30]	[1704.23]	[670.11]
1.000	V	--	--	--	--
2.000	W	--	--	--	--
1.000	Y	--	--	--	--
1.000	Zn	--	--	[228.62]	--
1.000	Zr	--	[75.14]	1478.16	[68.77]

Note: 1) Overall error greater than 10-times detection limit is estimated to be within +/- 15%.

2) Values in brackets [] are within 10-times detection limit with errors likely to exceed 15%.

3) "--" indicate measurement is below detection. Sample detection limit may be found by multiplying "det. limit" (far left column) by "multiplier" (top of each column).

Multiplier=	54.5	63.4	56.5	61.1
ALOW=	96-001702 @2	96-001703 @2	96-001704 @2	96-001705 @2
Client ID=	3C95159-04	3C95159-05	3C95159-06	3C95159-07
Det. Limit (ug/mL)	Run Date=	12/20/95	12/20/95	12/20/95
(Analyte)	ug/g	ug/g	ug/g	ug/g
0.500	Ag	--	--	--
1.000	Al	1678.23	6190.01	1054.91
1.000	As	--	--	--
0.500	B	[79.46]	[56.93]	[64.93]
0.500	Ba	--	[33.80]	--
0.100	Be	--	--	--
1.000	Bi	[59.32]	--	--
1.000	Ca	6784.29	5964.08	1229.20
0.100	Cd	[19.09]	--	--
1.000	Ce	--	--	--
1.000	Co	[239.97]	--	--
0.100	Cr	5348.14	608.63	138.22
0.100	Cu	2706.08	13398.67	5687.94
1.000	Dy	--	--	--
1.000	Eu	--	--	--
0.050	Fe	46500	20400	4420.02
5.000	K	[914.61]	3394.73	[712.91]
1.000	La	--	--	--
1.000	Li	--	--	--
1.000	Mg	1680.99	1433.84	[288.10]
0.500	Mn	388.83	[276.85]	[47.44]
1.000	Mo	1256.77	--	--
5.000	Na	19829.69	225000	268000
1.000	Nd	--	--	--
1.000	Ni	10313.66	[91.98]	--
1.000	P	1288.46	[196.54]	--
1.000	Pb	754.19	[448.43]	[241.36]
5.000	Pd	--	--	--
1.000	Rh	--	--	--
10.000	Ru	[335.45]	--	--
1.000	Sb	--	--	--
2.000	Se	--	--	--
5.000	Si	--	[1126.81]	[1020.65]
10.000	Sn	[1376.75]	--	--
0.100	Sr	[53.26]	[24.08]	--
5.000	Te	--	--	--
5.000	Th	--	--	--
1.000	Ti	[60.71]	[326.63]	[71.71]
5.000	Tl	--	--	--
1.000	U	11643.13	[739.01]	[485.32]
1.000	V	[70.49]	--	--
2.000	W	[112.30]	--	--
1.000	Y	--	--	--
1.000	Zn	548.83	[379.38]	[86.14]
1.000	Zr	--	1690.75	593.88
				[220.22]

Note: 1) Overall error greater than 10-times detection limit is estimated to be within +/- 15%.

2) Values in brackets [] are within 10-times detection limit with errors likely to exceed 15%.

3) "--" indicate measurement is below detection. Sample detection limit may be found by multiplying "det. limit" (far left column) by "multiplier" (top of each column).

Det. Limit (ug/mL)	Multiplier= ALO#= Client ID= Run Date= (Analyte)	65.3 96-001706 @2 3C95159-08 12/20/95 ug/g	59.3 96-001707 @2 3C95159-09 12/20/95 ug/g	62.6 96-001707 DUP @2 3C95159-09 Dup 12/20/95 ug/g	
0.500	Ag	--	--	--	--
1.000	Al	1121.54	2237.73	2034.55	--
1.000	As	--	--	--	--
0.500	B	[109.55]	[43.82]	[40.52]	--
0.500	Ba	[102.50]	[32.90]	--	--
0.100	Be	--	--	--	--
1.000	Bi	--	--	--	--
1.000	Ca	[333.91]	3438.20	3016.97	--
0.100	Cd	--	[10.41]	[9.00]	--
1.000	Ce	--	[119.05]	[92.14]	--
1.000	Co	--	--	--	--
0.100	Cr	7043.18	7950	5776.48	--
0.100	Cu	411.05	24114.02	19867.72	--
1.000	Dy	--	--	--	--
1.000	Eu	--	--	--	--
0.050	Fe	32400	54700	48100	--
5.000	K	[822.69]	[1756.45]	[1482.30]	--
1.000	La	--	--	--	--
1.000	Li	--	--	--	--
1.000	Mg	[282.37]	1024.35	896.71	--
0.500	Mn	[123.81]	781.78	668.36	--
1.000	Mo	2846.45	--	--	--
5.000	Na	[2034.49]	225000	204000	--
1.000	Nd	--	--	--	--
1.000	Ni	726.77	[272.78]	[234.71]	--
1.000	P	[184.52]	[128.42]	[134.12]	--
1.000	Pb	2898.15	[122.68]	[102.90]	--
5.000	Pd	--	--	--	--
1.000	Rh	--	--	--	--
10.000	Ru	--	[439.89]	--	--
1.000	Sb	--	--	--	--
2.000	Se	--	--	--	--
5.000	Si	[531.50]	[380.71]	[408.13]	--
10.000	Sn	--	[1696.77]	[1267.45]	--
0.100	Sr	[15.96]	[36.82]	[31.21]	--
5.000	Te	--	--	--	--
5.000	Th	--	--	--	--
1.000	Ti	--	[245.90]	[210.84]	--
5.000	Tl	--	--	--	--
1.000	U	1341.33	1747.59	1438.94	--
1.000	V	[207.80]	--	--	--
2.000	W	[469.83]	--	--	--
1.000	Y	--	--	--	--
1.000	Zn	[198.14]	[133.30]	[113.84]	--
1.000	Zr	[301.18]	14800	13000	--

Note: 1) Overall error greater than 10-times detection limit is estimated to be within +/- 15%.
 2) Values in brackets [] are within 10-times detection limit with errors likely to exceed 15%.
 3) "--" indicate measurement is below detection. Sample detection limit may be found by multiplying "det. limit" (far left column) by "multiplier" (top of each column).

ATTACHMENT "2"

TOTAL ALPHA AND TOTAL BETA ANALYSIS

"ACID DIGESTION" ANALYTICAL RESULTS

AND

GAMMA ENERGY ANALYSIS

"DIRECT" ANALYTICAL RESULTS

Battelle Pacific Northwest Laboratory
Analytical Chemistry Laboratory
Radiochemistry Group - 325 Bldg.

96-1699
1/3/96

Client: J.W. Rich
Wp#: ED6202

Cognizant Scientist: L.R. Greenwood

Date: 1-3-96

Review: T. Trang - l

Date: 1/3/96

Measured Activities (pCi/g)

ALO ID Client ID	Total Alpha Error +/-	Total Beta Error +/-	Gamma Energy Analysis	
			U-235 Error +/-	U-238 Error +/-
96-1699	5.51E 2	3.46E 2	1.28E 1	2.61E 2
3C95159-01	7%	5%	6%	10%
96-1700	9.39E 2	1.18E 3	2.81E 1	6.49E 2
3C95159-02	6%	4%	14%	17%
96-1701	6.51E 2	4.76E 2	2.32E 1	3.76E 2
3C95159-03	7%	4%	6%	9%
96-1702	8.43E 3	7.01E 3	2.45E 2	4.61E 3
3C95159-04	7%	4%	15%	17%
96-1703	4.32E 2	4.28E 2	2.51E 0	4.56E 1
3C95159-05	8%	4%	17%	23%
96-1704	3.96E 2	3.00E 2	1.68E 0	3.47E 1
3C95159-06	8%	5%	18%	24%
96-1705	1.44E 2	1.37E 2	3.83E 0	9.37E 1
3C95159-07	12%	5%	11%	16%
96-1706	1.10E 3	1.26E 3	3.69E 1	5.42E 2
3C95159-08	7%	4%	17%	21%
96-1707	6.77E 2	9.32E 2	2.12E 1	9.65E 2
3C95159-09	5%	4%	10%	10%
96-1707Dup	5.91E 2	1.03E 3		
3C95159-09	6%	4%		
Matrix Spike 1699	98%	107%		
Blank 1699	<2. E-1	<4. E-1		

App 7C-14

DOE/RL-90-11, Rev. 1
March 1966

ATTACHMENT "3"

INDUCTIVELY COUPLED PLASMA SPECTROMETER

"FUSION" ANALYTICAL RESULTS

**Battelle PNNL/ACL/Inorganic Analysis Group:
ICPAES Analytical Report**

WO/Project: ED6202/20063
Client: JW Rich
Impact Level: I

ACL Nmbr(s): 96-001701 through 96-001703, 96-001706 and 96-001707

Client ID: "3C-95159-03" to "3C-95159-09"

ASR Nmbr 2686-01

Total Sample(s): 5

Procedure: PNNL-ALO-211, "Determination of Elements by Inductively Coupled
Argon Plasma Atomic Emission Spectrometry" (ICP-AES).

Analyst: DR Sanders

Analysis Date (Filename): 01/23/96 (A0057)

See ALO System File: "ICP-325-405-1" for traceability to Calibration,
Quality Control, Verification, and Raw Data.

M&TE Number: ICPAES instrument -- WB73520
Mettler AT400 Balance -- Ser.No. 360-06-01-029

1-25-96
Reviewed by

1-25-96
Concur

1/25/96

Page 1

**Battelle PNNL/ACL/Inorganic Analysis Group:
ICPAES Analytical Report**

Five radioactive sediment samples, a process blank and a standard reference material (NIST SRM-2709) were prepared by the 325 SAL-SRPL lab. for ICPAES analysis using PNL ALO-115 Procedure (KOH-KNO₃ Fusion). Aliquot weights of approximately 0.15 gram were used for each sample prepared. Final sample volume after digestion was adjusted to 100 mL. Most of the sediment (sample) was solubilized but not all. Sample 96-001701 and the duplicate aliquot contained a very small amount of unfused material. Samples 96-001702 and 96-001703 contained a very small amount of brown precipitate material following fusion. Before analysis all sample solutions were filtered to remove insoluble residue. Analytical dilution of 2 fold and 10 fold dilution was necessary in order to keep the overall solution concentration below 0.5% TDS (total dissolved solids) and also to measure the very high concentrations of Si and Na.

Measurement results indicated some samples had high concentrations of Aluminum (3.4 wt%), Calcium (0.9 wt%), Chromium (2.5 wt%), Copper (2.0 wt%), Iron (9.7 wt%), Lead (0.34 wt%), Sodium (23.6 wt%), Silicon (42 wt%), Uranium (1.2 wt%) and Zirconium (1.5 wt%). Other analytes were present but lower in concentration. The measurement uncertainty for analytes shown in brackets may be higher than normal due to the interference effects from Uranium.

Sample 96-001701 was post-spiked with all of the analytes detected by ICPAES analysis (except Ce, Sn, U, and W). All post-spike analytes were recovered within acceptable tolerance (85% to 115%).

A duplicate sample aliquot was prepared (96-001701 DUP) and analyzed. The duplicates varied in concentration by up to a factor of 2 or more for analytes such as Ba, Cu, Ca, Fe, Si, Ti and Zr. Other analytes such as Al, Cr, Mg, Mn, Mo, Na, P, and V varied by less than approximately $\pm 15\%$ RPD (Relative Percent Difference).

Attached is an "ICPAES Data Report" for sample measurement results, detection limits, and etc. All results have been corrected for sample processing including analytical dilution. Please note, bracketed values listed in the data report are within ten times instrument detection limit. Those measurement values have a potential uncertainty much greater than 15%.

1/25/96

Page 2

**Battelle PNNL/ACL/Inorganic Analysis Group:
ICPAES Analytical Report**

Comments:

- 1) "Final Results" have been corrected for all laboratory dilutions performed on the sample during processing and analysis unless specifically noted.
- 2) Detection limits (DL) shown are for acidified water. Detection limits for other matrices may be determined if requested.
- 3) Routine precision and bias is typically $\pm 15\%$ or better for samples in dilute, acidified water (eg. 2% v/v HNO_3 or less) at analyte concentrations greater than ten times detection limit up to the upper calibration level. This also presumes that the total dissolved solids concentration in the sample is less than 5000 mg/mL (0.5 per cent by weight).
- 4) Absolute precision, bias and detection limits may be determined on each sample if required by the client.
- 5) The maximum number of significant figures for all ICP measurements is 2.
- 6) To convert "WT%" to "mg/Kg" or " $\mu\text{g/g}$ ", multiply concentration value by 10,000.
- 7) To convert "mg/Kg" or " $\mu\text{g/g}$ " to "WT%", divide concentration value by 10,000.

1/25/96

Page 3

Det. Limit (ug/mL)	Multiplier= ALO#= Client ID= Run Date= (Analyte)	1460.9 96-1701 @2 3C-95159-03 1/23/96 ug/g	1166.2 96-1701 DUP @2 3C-95159-03 1/23/96 ug/g	1196.2 96-1702 @2 3C-95159-04 1/23/96 ug/g	1236.1 96-1703 @2 3C-95159-05 1/23/96 ug/g
0.050	Ag	--	--	--	--
0.060	Al	10197.75	9596.42	6055.00	11039.34
0.200	As	--	--	--	--
0.050	B	--	[72.51]	--	--
0.010	Ba	[30.20]	655.45	[40.20]	[95.70]
0.005	Be	--	--	--	--
0.150	Bi	--	--	--	--
0.050	Ca	2711.22	4258.37	9377.02	9235.17
0.015	Cd	--	--	[25.94]	--
0.150	Ce	--	[180.75]	--	--
0.025	Co	[172.36]	[165.15]	354.67	--
0.020	Cr	16835.35	14650.04	11359.33	413.16
0.025	Cu	[359.01]	617.13	2864.88	8026.11
0.050	Dy	--	--	--	--
0.100	Eu	--	--	--	--
0.020	Fe	68530.02	56143.09	66332.24	17445.49
0.050	La	--	--	--	--
0.050	Li	--	--	--	--
0.250	Mg	[1148.79]	[1211.03]	[2816.50]	[2776.77]
0.005	Mn	1983.51	1723.92	1128.58	356.65
0.030	Mo	1163.33	1128.77	1898.07	--
0.080	Na	5018.63	5303.43	23124.33	223105.53
0.150	Nd	--	--	--	--
0.250	P	[575.85]	[603.85]	[1268.67]	[386.28]
0.250	Pb	--	[510.32]	[912.03]	[397.47]
0.500	Pd	--	--	--	--
0.300	Rh	--	--	--	--
0.100	Ru	--	--	--	--
0.250	Sb	--	[385.07]	--	--
0.250	Se	--	--	--	--
0.500	Si	420000	305000	89341.23	39018.43
1.000	Sn	--	--	[1308.96]	--
0.025	Sr	--	[29.32]	[60.77]	[59.21]
0.500	Te	--	--	--	--
0.800	Th	--	--	--	--
0.025	Tl	658.26	2387.06	507.24	1250.01
0.500	Tl	--	--	--	--
2.500	U	--	[4158.74]	[17262.18]	--
0.050	V	[101.33]	[95.55]	[124.31]	--
0.500	W	--	--	--	--
0.025	Y	--	--	--	--
0.020	Zn	[61.56]	[111.90]	705.91	247.23
0.100	Zr	5527.14	4498.74	1305.33	[1019.90]

Note: 1) Overall error greater than 10-times detection limit is estimated to be within +/- 15%.
 2) Values in brackets [] are within 10-times detection limit with errors likely to exceed 15%.
 3) "--" indicate measurement is below detection. Sample detection limit may be found by multiplying "det. limit" (far left column) by "multiplier" (top of each column).

Det. Limit (ug/mL)	Multiplier= ALO#= Client ID= Run Date= (Analyte)	1520.9 96-1706 @2 3C-95159-08 1/23/96 ug/g	1195.5 96-1707 @2 3C-95159-09 1/23/96 ug/g	1282.1 PREP BLANK @2 1/23/96 ug/g	
0.050	Ag	--	--	--	--
0.060	Al	33993.66	4281.34	[172.91]	--
0.200	As	--	--	--	--
0.050	B	[160.71]	--	--	--
0.010	Ba	171.39	[50.01]	--	--
0.005	Be	--	--	--	--
0.150	Bi	--	--	--	--
0.050	Ca	2934.46	4663.11	[615.19]	--
0.015	Cd	--	--	--	--
0.150	Ce	--	[238.65]	--	--
0.025	Co	[194.87]	[32.24]	--	--
0.020	Cr	25266.17	6699.39	--	--
0.025	Cu	779.41	20518.68	[34.99]	--
0.050	Dy	--	--	--	--
0.100	Eu	--	--	--	--
0.020	Fe	96661.95	53257.48	[91.90]	--
0.050	La	--	--	--	--
0.050	Li	--	--	--	--
0.250	Mg	5087.59	[1125.68]	--	--
0.005	Mn	2291.65	845.82	105.58	--
0.030	Mo	4750.31	--	--	--
0.080	Na	7843.04	235755.01	3091.46	--
0.150	Nd	--	--	--	--
0.250	P	[568.65]	[318.09]	--	--
0.250	Pb	[3358.30]	--	--	--
0.500	Pd	--	--	--	--
0.300	Rh	--	--	--	--
0.100	Ru	--	--	--	--
0.250	Sb	--	--	--	--
0.250	Se	--	--	--	--
0.500	Si	192829.26	20295.68	[747.08]	--
1.000	Sn	--	--	--	--
0.025	Sr	[53.72]	[46.44]	--	--
0.500	Te	--	--	--	--
0.800	Th	--	--	--	--
0.025	Ti	3541.84	433.04	--	--
0.500	Tl	--	--	--	--
2.500	U	--	[3320.73]	--	--
0.050	V	[302.87]	--	--	--
0.500	W	[2868.59]	--	--	--
0.025	Y	--	--	--	--
0.020	Zn	[296.99]	[145.06]	--	--
0.100	Zr	7393.20	15185.25	--	--

Note: 1) Overall error greater than 10-times detection limit is estimated to be within +/- 15%.
2) Values in brackets [] are within 10-times detection limit with errors likely to exceed 15%.
3) "--" indicate measurement is below detection. Sample detection limit may be found by multiplying "det. limit" (far left column) by "multiplier" (top of each column).

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