CHAPTER 2.0
UNIT DESCRIPTION

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ABBREVIATIONS AND ACRONYMS

CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
CFR	*Code of Federal Regulations*
CMS	corrective measures study
DOE	U.S. Department of Energy
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
ICP	inductively coupled plasma
LWDF	liquid waste disposal facility
MTCA	*Model Toxics Control Act*
OU	operable unit
Permit	Hanford Facility Dangerous Waste Permit
QA	quality assurance
QC	quality control
RCRA	*Resource Conservation and Recovery Act of 1980*
RL	U.S. Department of Energy, Richland Operations Office
ROD	record of decision
SEPA	State Environmental Policy Act
TOX	total organic halogen
TSD	treatment, storage, and disposal
WAC	*Washington Administrative Code*

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2.0 UNIT DESCRIPTION

Attachment 42 presents the closure plan for the 1324-N Surface Impoundment (1324-N), also known by the designation 120-N-2, and for the 1324-NA Percolation Pond (1324-NA), also known by the designation 120-N-1. The 1324-N and 1324-NA terminology will be used throughout this appendix because the liquid waste disposal facilities are identified as such in their Part A, Form 3, Permit. These nonradioactive dangerous waste units operated as treatment and disposal units under the authority of the *Washington Administrative Code* (WAC) 173-303. Closure of these units will commence pursuant to WAC 173-303-610 and the Hanford Facility Dangerous Waste Permit (Permit). Modification of the Permit to include this closure plan is anticipated to occur in calendar year 1998.

Soil data obtained during previous sampling efforts do not identify dangerous waste constituents above *Model Toxics Control Act* (MTCA) Method B residential standards. Thus, the soil column meets clean closure standards pursuant to Permit condition II.K.1. However, groundwater contaminated by sulfate will require closure of these units under a modified closure option in accordance with Permit Condition II.K.3.

2.1 Regulatory Background

The 1324-N and 1324-NA units are operated by U.S. Department of Energy (DOE), Richland Operations Office (RL) and co-operated by Bechtel Hanford, Inc. Although the U.S. Government holds legal title to this facility, the RL, for purposes of regulation under WAC 173-303, is considered the legal owner of the facility under existing U.S. Environmental Protection Agency (EPA) interpretive regulations (51 Federal Register 7722).

The Part A, Form 3, dangerous waste permit application documentation for these units was originally submitted to the Washington State Department of Ecology (Ecology) and the EPA in August 1986.

The Part A for the 1324-NA Percolation Pond defined this unit, during operation, as a treatment (through soil column neutralization) and disposal unit for acid and caustic waste. The 1324-N Surface Impoundment, a lined unit, was defined solely as a neutralization treatment unit during its operation. Three revisions of Part A have been submitted since that time. The latest revisions of these Part A's are contained in Attachment 42, Chapter 1.0. In addition, a State Environmental Policy Act (SEPA) checklist, pursuant to WAC 197-11-960, will be approved prior to incorporation of this closure plan into the Permit. A draft SEPA checklist is provided in DOE/RL-96-39, Rev. 1, Attachment B-3).

The Hanford Site Dangerous Waste Permit contains a schedule for incorporation of closure plans into the Permit. The closure plan for 1324-N and 1324-NA is scheduled for incorporation in 1998.

2.2 Closure Plan and Corrective Measures Study Integration

Closure of the 1324-N and 1324-NA units (collectively referred to as 1324-N and 1324-NA, but including the South Settling Pond and associated soils, structures, and piping) will occur under the authority of WAC 173-303. These units are also defined under the 100-NR-1 Operable Unit (OU) and are part of DOE/RL-96-39, Rev. 1, Treatment, Storage, and Disposal Corrective Measures Study.

DOE/RL-96-39, Rev. 1, Section 2.5.5concludes that no contaminants of concern associated with operation of these units remain in the soil above MTCA Method B residential levels. Information in the closure plan supports this determination and is in Attachment 42, Chapter 4.0, Section 4.3. However, a sulfate plume attributable to operation of these units exists with concentrations above the secondary drinking water standard as described in the DOE/RL-96-39, Rev. 1. The presence of this sulfate plume will require closure of 1324-N and 1324-NA under a modified closure option. Integrated TSD and OU closure actions will be necessary to return the area *to the appearance and use of the surrounding land areas to the degree possible given the nature of the previous dangerous waste activity* (WAC 173-303-610[2][a][(iii]) and to remediate the groundwater. Actions to accomplish this may include characterization to determine that piping and/or structures are clean, removing structures and piping associated with the units, backfilling, regrading and revegetating the area, and implementing

groundwater remedial technologies for cleanup of the sulfate plume. Attachment 42, Chapter 4.0 provides details of the closure activities and includes characterization data, cleanup standards, and actions to be taken to accomplish the closure activities.

Actions taken to remediate these TSDs will comply with the provisions of both CERCLA and RCRA. The CERCLA public involvement, including public notice and opportunity to comment, has been enhanced to concurrently satisfy the RCRA closure process. The remedy selected under CERCLA will be incorporated into the Hanford Facility RCRA Permit as the RCRA closure action after issuance of the public notice and comment process.

It is anticipated that the CERCLA ROD will be issued subsequent to the RCRA permit modification. Should the CERCLA ROD contain provisions inconsistent with the approved RCRA modifications, the Hanford Facility RCRA Permit will be again modified to reconcile these differences during the next permit modification cycle.

2.3 Closure Performance Standards

The closure performance standards of WAC 173-303-610(2) require that the owner/operator of a TSD unit close the unit in a manner that: (1) minimizes the need for further maintenance; (2) controls, minimizes, or eliminates postclosure escape of dangerous waste to the extent necessary to protect human health and the environment; and (3) returns the land to the appearance and use of surrounding land areas.

2.3.1 Minimize the Need for Further Maintenance

The 1324-N and 1324-NA units will achieve clean closure of the soil column; therefore, further maintenance will not be needed for surface activities after certification of closure. The existing groundwater-monitoring program (Borghese, et. al, 1996) will be continued upon the effective date of the Permit modification adding these units. This system will be operated to minimize maintenance activities.

2.3.2 Control Dangerous Waste Escape to Protect Human Health and the Environment

Because no dangerous waste or constituents above levels that are considered protective of human health and the environment exist in the soil column at these units prior to closure activities, this closure performance standard is not applicable to this media. Groundwater is administratively restricted from access as a drinking water source by RL and will continue to be restricted until decisions regarding remediation of the sulfate plume are made in a final ROD for the 100-NR-2 OU.

2.3.3 Return Land to Appearance and Use of Surrounding Area

The appearance and use of 1324-N and 1324-NA after closure will be consistent with the future use of the 100-N Area. Structures and piping that do not meet clean closure standards will be removed. Earthen basins will be backfilled, regraded, and revegetated in a manner consistent with the prior site condition.

2.4 General Description of Units

This section provides a general description of the 1324-NA Percolation Pond and 1324-N Surface Impoundment. This description is intended to provide an overview of these units.

1324-N, 1324-NA, the South Settling Pond (100-N-58), and soils contained within the current fence line surrounding these units are subject to this WAC 173-303 closure action. Pipelines associated with dangerous waste discharges from generating units to the ponds/surface impoundment are within this closure scope as well.

A chronology of events associated with these units is contained in Table 2-6 of DOE/RL-96-39, Rev. 1. A brief description of the units that are the subject of this closure plan is presented below.

From August 1977 until spring 1983, the 1324-N Settling Pond system consisted of the North and South Settling Ponds and the 1324-NA Percolation Pond. These ponds received both the corrosive regeneration wastes from the 163-N Demineralization Plant and the nondangerous filter backwash waste stream. Plugging of the settling ponds may have caused some flooding on the northern side of the units as described in DOE/RL-96-39, Rev. 1, Section 2.4.4.

Because all ponds received corrosive dangerous wastes after the effective date of regulation for TSD units (November 19, 1980), they are all subject to closure under dangerous waste regulations. The settling ponds, however, have never been described in the Part A, Form 3 that would define them as interim status TSD units.

The 1324-NA is a large, unlined, inactive pond that was used to treat corrosive wastes. The pond was placed in service in August 1977 and was used to treat corrosive regeneration wastes from the 163-N Demineralization Plant and to dispose of nondangerous filter backwash water from the 183-N Filtered Water Plant. The corrosive wastes were treated in the Percolation Pond by the alternate addition of acidic cation column regeneration wastes and alkaline anion column regeneration wastes and were concomitantly disposed of through percolation throughout the soil column.

1324-N is an inactive basin that was used as a neutralization pond for the corrosive wastes generated from the 163-N Demineralization Plant. The addition of sulfuric acid and sodium hydroxide in series into this unit resulted in a neutralized nondangerous wastewater. This wastewater was then routed to 1324-N. The 1324-N basin had a double liner as well as leak detection and leachate collection system. This site appears as an unlined basin next to the 1324-NA site today.

For a general discussion on the unit background and an in-depth description of 1324-N, 1324-NA, the South Settling Pond, and associated piping, refer to DOE/RL-96-39, Rev. 1, Section 2.4.4.

2.4.1 Topographical Maps

The topographical map for 1324-N and 1324-NA is provided in Figure 2-30 of DOE/RL-96-39, Rev. 1.

2.4.2 Floodplain

The U.S. Army Corp of Engineers (Jamison 1982) has calculated the probable maximum flood based on the upper limit of precipitation falling on a drainage area and other hydrologic factors such as antecedent moisture conditions, snowmelt, and tributary conditions that could lead to a maximum runoff. The probable maximum flood for the Columbia River below Priest Rapids Dam has been calculated to be 41 million L/s (1.4 million ft^3/s). The 1324-N and 1324-NA units are located above the 100-year floodplain.

2.4.3 Traffic

The majority of traffic inside the Hanford Site boundaries consists of light-duty vehicles used to transport employees to work areas. The 1324-N and 1324-NA units are located within the Hanford Controlled Access Area where roadways cannot be accessed by the general public. These units are isolated from the nearest public highway, State Highway 24, by approximately 6 km (4 mi). Vehicle traffic around the units is restricted and is minimal. Access to the units is prevented by a locked, 2.4-m (8-ft) chain link fence topped with barbed wire.

2.4.4 General Hydrogeologic Conditions

DOE/RL-96-39, Rev. 1, Section 2.4 provides information on the geology and hydrogeology underlying 1324-N and 1324-NA.

2.4.5 Physical Dimensions of the Waste Units

The 1324-NA Percolation Pond is a rectangular basin, 3.7 m (12 ft) deep, with outer dimensions of 95 m by 61 m (310 ft by 200 ft).

1324-N is a basin with outer dimensions of approximately 43 m by 23 m (140 ft by 75 ft) at grade, sloping to 24 m by 4.6 m (80 ft by 15 ft) at approximately 4.6 m (15 ft) below grade.

2.4.6 Design Capacity

Both 1324-N and 1324-NA units were designed with a 24-hour period discharge capacity of 1,050 L/min (277 gal/min).

2.4.7 Ancillary Equipment

The 1324-N and 1324-NA units are passive liquid waste handling/disposal units, which do not rely on active systems for operations support. The units consist of transfer piping, structures, and soil.

2.4.8 Containment Systems

The 1324-NA unit does not include containment systems. Diking exists between units. The 1324-N unit contains a double lining of 45-mil Hypalon and leak detection systems to contain disposed liquids and prevent percolation into the underlying soils.

2.4.9 Structures and Piping Requiring Removal or Characterization as Clean

Structures requiring removal include a sampling building, valve pits, leak detection systems, and the liners. Associated piping is described in DOE/RL-96-39, Rev. 1, Section 2.4.4.

2.4.10 Security

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

Within the Hanford Site are operational areas, including 100-N, to which access is restricted. There is a staffed checkpoint at the Wye Barricade through which access to the 100-N Area is allowed only to authorized personnel. Authorized personnel are those individuals with a DOE-issued security identification badge indicating the appropriate authorization. Such personnel are subject to a search of items carried into or out of controlled areas.

2.5 Waste Characteristics

2.5.1 Liquid Waste Discharges

The hazardous wastes treated in 1324-NA were produced by the regeneration of ion exchange columns in the 163-N Demineralizer Plant. The wastes consisted of acid and caustic regeneration fluids and process and cooling water flushes. The pH of the demineralized water plant wastes varied from less than 1.0 to 14 standard units. These discharges qualified as corrosive dangerous wastes defined in WAC 173-303-090(a)(i) when pH was less than 2.0, or greater than/equal to 12.5. The regeneration solutions would have contained a variety of metal constituents as a result of concentration on the ion exchange media. These metals were not detected at levels that would regulate them as characteristic waste (WAC 173-303-090).

Tables 2.1 and 2.2 contain the results of chemical analyses performed on the cation and anion regeneration wastes respectively. The analyses indicate that the discharges were corrosive dangerous wastes, but did not qualify as dangerous wastes under any of the other criteria. Table 2.3 contains analyses of the 183-N Filtered Water Plant backwash effluent, the nondangerous wastewater also discharged to 1324-N and 1324-NA.

2.5.2 Liquid Waste Discharge Chronology

A chronology of liquid waste discharges to the 1324-N/NA units is provided in Table 2.4.

Table 2.1. 163-N Demineralization Plant Regeneration Effluent Waste Analysis Cation Regeneration Cycle

Parameter (MDL)	Sample			
	1	2	3	Average
pH (standard units)	0.894	0.936	0.922	0.917
Conductivity (micromhos)	37000	40100	35000	37367
Mercury (.001 ppm)	ND	ND	ND	ND
Ethylene glycol (10 ppm)	ND	ND	ND	ND
Enhanced thiourea (.2 ppm)	ND	ND	ND	ND
TOC (1 ppm)	0.0013	0.0019	0.0018	0.0016
Cyanide (.01 ppm)	ND	ND	ND	ND
Barium (.006 ppm)	0.03	0.023	0.020	0.024
Cadmium (.002 ppm)	0.003	0.002	0.003	0.003
Chromium (.01 ppm)	ND	ND	ND	ND
Lead (.03 ppm)	ND	ND	ND	ND
Silver (.01 ppm)	ND	ND	ND	ND
Sodium (.1 ppm)	12.2	16.5	9.6	12.8
Nickel (.01 ppm)	ND	ND	ND	ND
Copper (.01 ppm)	ND	ND	ND	ND
Vanadium (.005 ppm)	0.025	0.027	0.020	0.024
Antimony (.1 ppm)	ND	ND	ND	ND
Aluminum (.15 ppm)	0.725	0.842	0.655	0.741
Manganese (.005 ppm)	0.027	0.035	0.027	0.030
Potassium (.1 ppm)	12.2	15.5	14.8	14.2
Iron (.05 ppm)	1.1	1.2	1.0	1.1
Beryllium (.005 ppm)	ND	ND	ND	ND
Osmium (.3 ppm)	ND	ND	ND	ND
Strontium (.3 ppm)	1.3	1.4	1.2	1.3
Zinc (.005 ppm)	0.016	0.024	0.067	0.036
Calcium (.05 ppm)	282.6	347.4	324.9	318.3
Nitrate (.5 ppm)	1.0	0.5	0.8	0.8
Sulphate (.5 ppm)	2310	4271	2952	3201
Fluoride (.5 ppm)	ND	ND	ND	ND
Chloride (.5 ppm)	2.0	1.8	1.9	1.9
Phosphate (1 ppm)	ND	ND	ND	ND
Phosphorus Pesticides (.005 ppm)	ND	ND	ND	ND

Parameter (MDL)	Sample			
	1	2	3	Average
Chlorinated Pesticides (.001 ppm)	ND	ND	ND	ND
Enhanced ABN List	ND	ND	ND	ND
Citrus Red (1 ppm)	ND	ND	ND	ND
Arsenic (.005 ppm)	ND	ND	ND	ND
Ammonium Ion (.05 ppm)	ND	ND	ND	ND
Coliform (3 MPN)	ND	ND	ND	ND
Selenium (.005 ppm)	ND	ND	ND	ND
Thallium (.01 ppm)	ND	ND	ND	ND
Enhanced VOA (10 ppm)	26	28	26	27

ND = Not Detected MDL = Minimum Detection Limit Data obtained from samples taken August 1985, DOE-RL (1994)

Table 2.2. 163-N Demineralization Plant Regeneration Effluent Waste Analysis Anion Regeneration Cycle

Parameter (MDL)	Sample			
	1	2	3	Average
pH (standard units)	13.72	13.74	13.77	13.74
Conductivity (micromhos)	62000	60000	70000	64000
Mercury (.001 ppm)	0.0001	0.0001	0.0001	0.0001
Ethylene glycol (10 ppm)	ND	ND	ND	ND
Enhanced thiourea (.2 ppm)	ND	ND	ND	ND
TOC (1 ppm)	462	499	456	472
Cyanide (.01 ppm)	0.01	0.015	ND	0.013
Barium (.006 ppm)	ND	ND	ND	ND
Cadmium (.002 ppm)	ND	ND	ND	ND
Chromium (.01 ppm)	ND	ND	ND	ND
Lead (.03 ppm)	ND	ND	ND	ND
Silver (.01 ppm)	ND	ND	ND	ND
Sodium (.1 ppm)	26910	28200	26330	27150
Nickel (.01 ppm)	ND	ND	ND	ND
Copper (.01 ppm)	ND	ND	ND	ND
Vanadium (.005 ppm)	ND	ND	ND	ND
Antimony (.1 ppm)	ND	ND	ND	ND
Aluminum (.15 ppm)	ND	ND	ND	ND
Manganese (.005 ppm)	ND	ND	ND	ND

Parameter (MDL)	Sample			
	1	2	3	Average
Magnesium (5 ppm)	ND	ND	ND	ND
Potassium (.1 ppm)	26.5	27.2	26.3	26.7
Iron (.05 ppm)	ND	ND	ND	ND
Beryllium (.005 ppm)	ND	ND	ND	ND
Osmium (.3 ppm)	ND	ND	ND	ND
Strontium (.3 ppm)	ND	ND	ND	ND
Zinc (.005 ppm)	ND	ND	ND	ND
Calcium (.05 ppm)	ND	ND	ND	ND
Nitrate (.5 ppm)	1.0	1.4	0.9	1.1
Sulphate (.5 ppm)	30.9	30.6	30.6	30.7
Fluoride (.5 ppm)	ND	ND	ND	ND
Chloride (.5 ppm)	2.5	2.3	2.3	2.4
Phosphate (1 ppm)	ND	ND	ND	ND
Phosphorus Pesticides (.005 ppm)	ND	ND	ND	ND
Chlorinated Pesticides (.001 ppm)	ND	ND	ND	ND
Enhanced ABN List	ND	ND	ND	ND
Citrus Red (1 ppm)	ND	ND	ND	ND
Arsenic (.005 ppm)	ND	ND	ND	ND
Ammonium Ion (.05 ppm)	2.3	2.7	2.8	2.6
Coliform (3 MPN)	---	0.023	0.009	0.016
Selenium (.005 ppm)	ND	ND	ND	ND
Thallium (.01 ppm)	ND	ND	ND	ND
Enhanced VOA (10 ppm)	26	28	26	27

ND = Not Detected

MDL = Minimum Detection Limit

Data obtained from samples taken August 1987.

DOE-RL (1994)

Table 2.3. 183-N Filtered Water Plant Backwash Effluent Analysis

Parameter (MDL)	Sample			
	1	2	3	Average
pH (standard units)	7.08	7.65	7.64	7.46
Conductivity (micromhos)	160	150	150	153
Mercury (.001 ppm)	ND	ND	ND	ND
Ethylene glycol (10 ppm)	ND	ND	ND	ND
Enhanced thiourea (.2 ppm)	ND	ND	ND	ND
TOC (1 ppm)	0.002	0.002	0.002	0.002
Cyanide (.01 ppm)	ND	ND	ND	ND
Barium (.006 ppm)	0.03	0.031	0.030	0.030
Cadmium (.002 ppm)	0.004	0.002	0.002	0.003
Chromium (.01 ppm)	ND	ND	ND	ND
Lead (.03 ppm)	ND	ND	ND	ND
Silver (.01 ppm)	ND	ND	ND	ND
Sodium (.1 ppm)	2.202	2.287	2.186	2.225
Nickel (.01 ppm)	ND	ND	ND	ND
Copper (.01 ppm)	ND	ND	ND	ND
Vanadium (.005 ppm)	ND	ND	ND	ND
Antimony (.1 ppm)	ND	ND	ND	ND
Aluminum (.15 ppm)	0.392	0.389	0.376	0.386
Manganese (.005 ppm)	0.020	0.015	0.014	0.016
Potassium (.1 ppm)	0.799	0.814	0.762	0.792
Iron (.05 ppm)	ND	ND	ND	ND
Beryllium (.005 ppm)	ND	ND	ND	ND
Osmium (.3 ppm)	ND	ND	ND	ND
Strontium (.3 ppm)	ND	ND	ND	ND
Zinc (.005 ppm)	ND	ND	ND	ND
Calcium (.05 ppm)	17.34	17.72	17.02	17.36
Nitrate (.5 ppm)	0.789	0.50	0.50	0.596
Sulphate (.5 ppm)	18.9	20.98	19.11	19.66
Fluoride (.5 ppm)	ND	ND	ND	ND
Chloride (.5 ppm)	2.846	2.671	2.901	2.806
Phosphate (1 ppm)	ND	ND	ND	ND
Phosphorus Pesticides (.005 ppm)	ND	ND	ND	ND
Chlorinated Pesticides (.001 ppm)	ND	ND	ND	ND

Enhanced ABN List	ND	ND	ND	ND
Citrus Red (1 ppm)	ND	ND	ND	ND
Arsenic (.005 ppm)	ND	ND	ND	ND
Ammonium Ion (.05 ppm)	ND	ND	ND	ND
Coliform (3 MPN)	0.24	2.4	2.4	1.68
Selenium (.005 ppm)	ND	ND	ND	ND
Thallium (.01 ppm)	ND	ND	ND	ND
Enhanced VOA (10 ppm)	---	0.24	0.25	0.25

ND = Not Detected MDL = Minimum Detection Limit Data obtained from samples taken August 1985, DOE-RL (1994)

Table 2.4. Chronology of Liquid Waste Discharges

Year	Liquid Waste Discharge to 1324-N and 1324-NA (L/day)
1964	0
1965	0
1966	0
1967	0
1968	0
1969	0
1970	0
1971	0
1972	0
1973	0
1974	0
1975	0
1976	0
1977	1,703,250
1978	1,703,250
1979	1,703,250
1980	1,703,250
1981	1,703,250
1982	1,703,250
1983	1,703,250
1984	1,703,250
1985	1,703,250
1986	1,703,250
1987	1,703,250
1988	1,703,250
1989	1,703,250
1990	1,703,250
1991+	0

WHC (1991)