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CHAPTER 4.0
CLOSURE ACTIVITIES

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CHAPTER 4.0
CLOSURE ACTIVITIES

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1 **4.0 CLOSURE ACTIVITIES**

2 The physical activities required to close 1324-N and 1324-NA in accordance with [WAC 173-303-610](#) and
3 the Permit will be integrated with the Record of Decision (ROD) for DOE/RL-96-39, Rev. 1 and the
4 100-NR-1/100-NR-2 corrective measure study. Closure activities necessary to comply with dangerous
5 waste regulations and the Permit will need to be consistent with the Comprehensive Environmental
6 Response, Compensation, and Liability Act (CERCLA) activities. CERCLA activities will be required to
7 include elements necessary for closure of a dangerous waste unit.

8 **4.1 Removal of Structures**

9 There will be no remediation excavation in the 1324-N/NA earthen basins for closure, but the Hypalon™
10 liner and leak detection systems in the 1324-N Surface Impoundment will be removed, using
11 conventional excavation equipment, and disposed as noncontaminated waste. In addition, the sampling
12 shed and perimeter fence will be removed. The structures are discussed in DOE/RL-96-39, Rev. 1,
13 Section 2.4.4. DOE/RL-96-39, Rev. 1, Figure 2-29 shows the surface impoundment, sampling shed and
14 perimeter fence.

15 The Hypalon™ liner, sampling shed, perimeter fence, and signage will be demolished and removed using
16 conventional demolition/earthmoving equipment. The demolished components will be disposed of in an
17 appropriate non-hazardous disposal facility or recycled as scrap, as appropriate.

18 **4.2 Piping Removal or Characterization as Clean**

19 Should a determination be made that piping associated with the units may be able to meet clean closure
20 standards and be left in place, the determination will then be submitted to the Washington State
21 Department of Ecology (Ecology) for its concurrence. This determination may be based on process
22 knowledge, sampling, or both. Specific sampling requirements will be developed after the ROD and
23 during the remedial design phase of the remedial action. Where piping cannot be determined to be clean,
24 the influent pipelines between the 163-N facility and the 1324-N/NA units will be excavated and removed
25 for disposal as scrap metal destined for recycling. Should piping not be appropriate for recycling, it will
26 be sampled to determine its regulatory status and treated and disposed of accordingly. This piping is
27 shown in DOE/RL-96-39, Rev. 1, Figure 2-28. DOE/RL-96-39, Rev. 1, Appendix D provides the
28 reference maps and estimated pipe lengths.

29 If removal of the buried pipelines is required, they will be unearthed by conventional excavation
30 equipment. The exposed piping will be segmented for removal manually or with the excavation
31 equipment. Contamination controls will focus on the drainage of residual fluids in the piping prior to, and
32 during, segmentation and on the control of airborne contamination during cutting and pipe handling
33 operations. After the piping has been removed, the pipe bedding soil will be surveyed for residual
34 contamination, excavated, and disposed as necessary.

35 **4.3 Evaluation of Soil Data**

36 **4.3.1 Sampling and Analysis**

37 Soil samples associated with the vadose zone at 1324-N and 1324-NA were collected from two boreholes
38 and one test pit in late 1992 and early 1993. The test pit was excavated in the 1324-NA percolation pond,
39 and samples were collected from the surface to 21.3 m (70 ft) in 1.5-m (5-ft) intervals. Samples from
40 borehole 199-N-88 were collected from the surface to 21.9 m (72 ft), and samples from borehole
41 199-N-89 were collected from the surface to 23.2 m (76 ft). All the borehole samples were collected in
42 approximately 1.5-m (5-ft) intervals, and composited over 0.15- to 0.76-m (0.5- to 2.5-ft) intervals. A
43 total of 53 samples were collected from the three areas. Figure 4.1 contains a map showing the sample
44 locations.

45 Data for ICP metals, mercury, cyanide, pH, and anions are presented in DOE/RL-96-39, Rev. 1,
46 Attachment B-4. Analyses for organic constituents were also performed, but none of these were present
47 above detection limits; thus, they will not be discussed further.

1 The following sections use these data to evaluate whether the activities that occurred at 1324-N and 1324-
2 NA have impacted the vadose zone soils.

3 Samples collected from the test pit and borehole 199-N-88 provide data on vadose zone soil composition
4 beneath 1324-NA and the South Settling Pond, respectively. If significant amounts of contamination
5 were deposited in the vadose zone under these two ponds, the data presented here would likely show
6 evidence of this contamination. Borehole 199-N-89 is located to the northwest of 1324-N. Because of
7 the boreholes location, using data from it to assess dangerous waste in the vadose zone is questionable.

8 **4.3.2 Assessment of Contamination**

9 In order to evaluate if 1324-N and 1324-NA have released contamination into the vadose zone, the data
10 described above were statistically summarized and compared to background levels for the Hanford Site.
11 Background is allowed as a default cleanup level in most environmental regulations (e.g., [WAC 173-303](#),
12 [WAC-173-340](#)), which recognize that background levels are rarely detrimental to human health or the
13 environment and that remediating to levels below background concentrations is futile. The comparison
14 with background values follows the methodology recommended by Ecology (Ecology 1992).

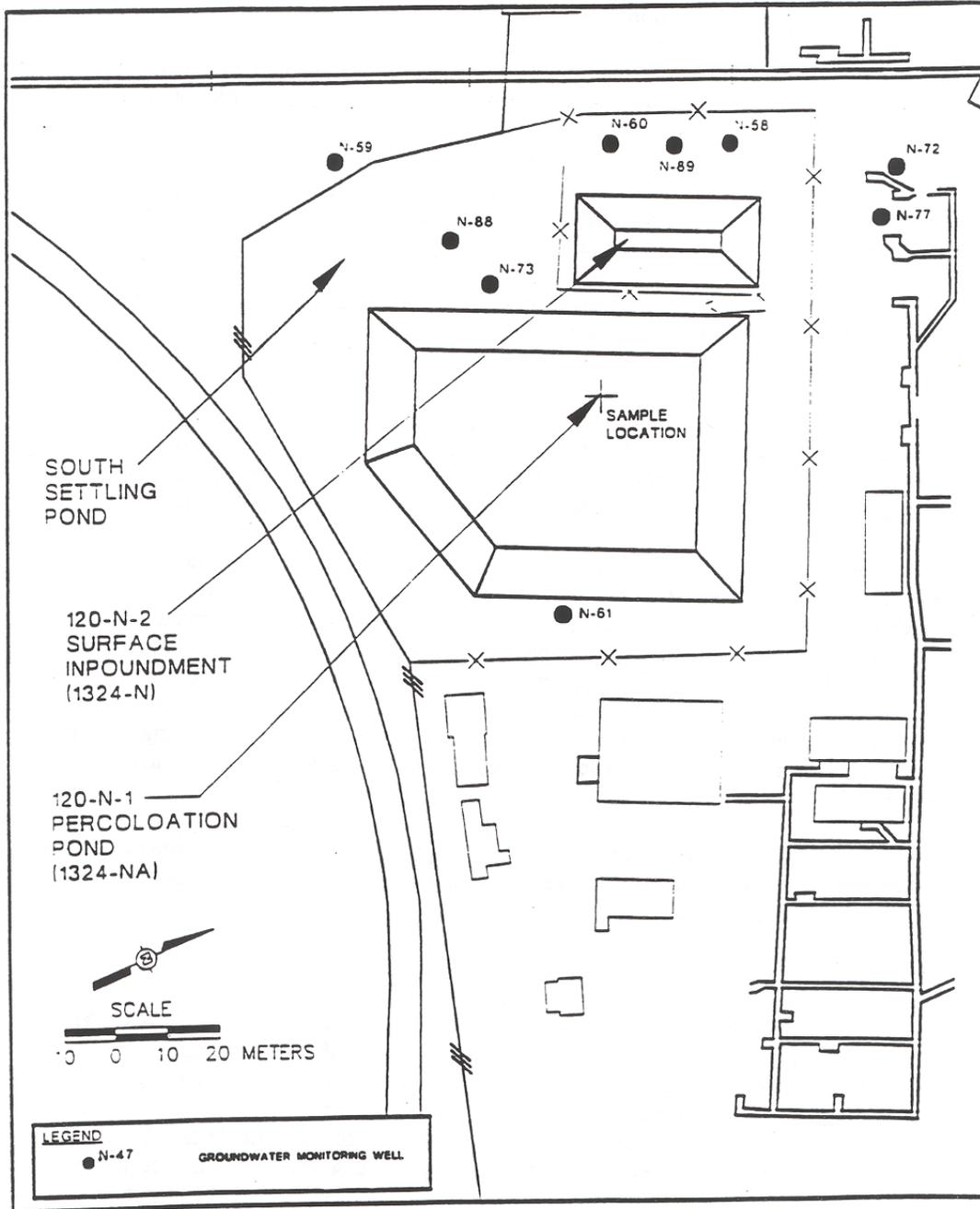
15 [Table 4.1](#) lists the upper 95% confidence limit on the mean of the data from the units, as well as other
16 statistical values. The data were determined to follow a log normal distribution, so the statistics were
17 calculated on that basis.

18 [Table 4.2](#) presents the evaluation of the data compared to background, using the three-part test
19 recommended by Ecology. The data pass the first part of the test, which compares the background value
20 at the 90th percentile to the 95% upper confidence level on the mean of the waste site data. Using this
21 comparison, the data are below background for all analytes.

22 The second and third parts of the Ecology test evaluate frequency and magnitude of exceedences of the
23 data above comparison criteria levels (background, in this case). The allowable frequency of exceedences
24 for comparison to background is determined by using the binomial theorem to calculate the probability
25 that a single sample is greater than background at a probability of 0.10. This calculation requires
26 knowledge of the percentile chosen for background (0.90), the number of samples from the units (53), and
27 the exceedence frequency (0.10). Using this criterion, a maximum of eight exceedences is allowed.
28 Copper is the only analyte that has a significant number of exceedences (seven samples; see [Table 4.2](#)),
29 and it is below the maximum number permitted.

30 The third part of the Ecology test requires that the largest value from the waste site data be less than two
31 times the cleanup level. As seen in DOE/RL-96-39, Rev. 1, Attachment B-4, none of the analytes exceed
32 this criterion.

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Figure 4.1. Sample Locations for 1324-N and 1324-NA Soil Data

Table 4.1. Statistical Summary of Data from 1324-N/1324-NA/South Settling Pond Treatment, Storage and Disposal Unit (TSD)

	Geo. Mean	Min	Max	N	90th Percentile	95% UCL on Mean
Antimony ^a	3.04	1.70	6.35	53	5.14	3.66
Arsenic	1.05	0.37	3.5	53	2.03	1.37
Barium	48.43	16.80	93.7	53	72.61	54.99
Chromium	4.56	0.65	14.6	53	13.28	8.23
Cobalt	8.12	1.05	15.8	53	16.09	10.78
Copper	14.06	2.60	31.5	53	27.36	18.45
Fluoride	1.14	0.30	3.2	53	2.17	1.47
Lead	2.76	1.50	6.4	53	4.54	3.28
Manganese	213	73.80	702	53	341.81	250
Mercury	0.038	0.02	0.37	53	0.10	0.061
PH	8.10	5.6	9.8	53	9.76	8.42
Nickel	7.40	2.08	17.6	53	12.13	8.77
Selenium ^a	0.60	0.21	2.5	53	1.17	0.79
Sulfate	32.81	6.00	135	53	77.37	49.41
Vanadium	33.02	3.70	81.1	53	80.45	50.96
Zinc	34.74	6.80	94.4	53	67.80	45.66

^a Background values for these analytes were below detection limit; highest detection limit reported by the laboratory is used. UCL = Upper Confidence Limit

Table 4.2. Comparison of TSD Soil Data to Background

	Average	Upper 95 UCL on Mean	Background, 90th percentile	# of data > BG	% of data > BG	Max value/ background
Antimony	3.29	3.66	11.1	0	0.0	0.57
Arsenic	1.20	1.37	6.47	0	0.0	0.54
Barium	50.68	54.99	132	0	0.0	0.71
Chromium	6.00	8.23	18.5	0	0.0	0.79
Cobalt	9.07	10.78	15.7	1	1.9	1.01
Copper	15.70	18.45	22	7	13.2	1.43
Fluoride	1.28	1.47	2.81	3	5.7	1.14
Lead	2.99	3.28	10.2	0	0.0	0.63
Manganese	227	250	512	1	1.9	1.37
Mercury	0.05	0.06	0.33	1	1.9	1.12
Nickel	7.92	8.77	19.1	0	0.0	0.92
Selenium	0.70	0.79	5	0	0.0	0.50
Sulfate	40.69	49.41	237	0	0.0	0.57
Vanadium	39.40	50.96	85.1	0	0.0	0.95
Zinc	38.85	45.66	67.8	4	7.5	1.39

UCL = Upper Confidence Limit

1 **4.3.3 Summary and Recommendations**

2 The data presented here strongly indicate that the vadose zone under 1324-N, 1324-NA, and the South
3 Settling Pond has concentrations of metals indistinguishable from background compositions. The data
4 used to lead to this conclusion were obtained from samples located in areas expected to record adverse
5 impacts from the units. An exception to this is the lack of data from samples that may have been
6 influenced by an overflow of the North Settling Pond. There are some indications that this event may
7 have occurred and that standing water was present in the northern portion of the units. To evaluate any
8 impacts from an event of this kind, two samples will be collected from the northern part of the units and
9 analyzed for metals, pH, and sulfate. The location of the samples will be determined and agreed upon by
10 all parties involved in the closure decisions.

11 **4.4 Waste Management**

12 Closure of the 1324-N and 1324-NA units may generate small quantities of clean or contaminated
13 nonradioactive debris. Disposal of these wastes will be dependent upon their level of contamination. It is
14 doubtful that dangerous waste will be generated during cleanup of these units, however, should dangerous
15 waste be generated, its management will occur in compliance with [WAC 173-303](#). Waste generated as
16 part of this closure activity will be managed and disposed of in such a way as to ensure protection of
17 human health and the environment.

18 Waste generation, management, and disposal will be conducted in accordance with operational
19 procedures and with all State, Federal, and U.S. Department of Energy (DOE) Orders and regulations
20 dealing with waste, including agreements with the public and stakeholders.

21 **4.5 Site Restoration**

22 After the system structures and piping have been removed or they have been characterized as clean, the
23 earthen basins will be backfilled, regraded, and revegetated in a manner consistent with the prior site
24 condition.

25 **4.6 Personnel Training**

26 No radioactive or dangerous waste constituent hazards are expected to be encountered during closure
27 activities at 1324-N and 1324-NA, nor are dangerous wastes expected to be generated. However, should
28 hazards be encountered or dangerous waste be generated that were not anticipated, training will be
29 provided to site personnel in accordance with the site-specific training plan contained in DOE/RL-96-39,
30 Rev. 1, Attachment B-5.

31 Training required during closure activities for personnel involved in the groundwater-monitoring program
32 are the same as those identified in Attachment 42, Chapter 5.0, §5.5 the Postclosure Plan.

33 **4.7 Closure Contact**

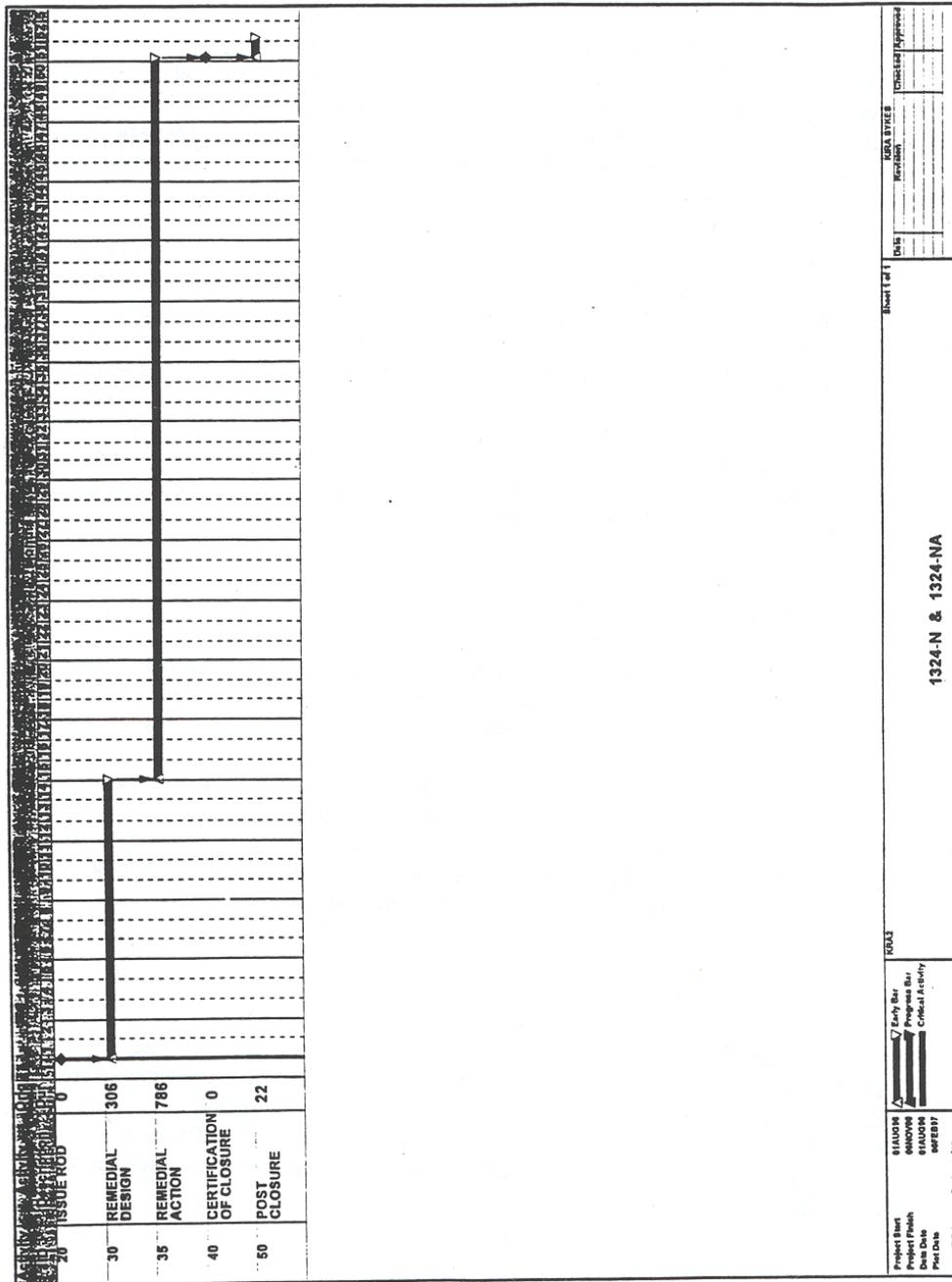
34 The DOE-RL will be the official contact during the postclosure period at the following address:

35 Director, Office of Environmental Services*
36 U.S. Department of Energy
37 Richland Operations Office
38 P.O. Box 550
39 Richland, Washington 99352

40 *or its equivalent should there be a future reorganization at DOE-RL

41 **4.8 Closure Schedule**

42 The closure schedule for 1324-N (120-N-2) and 1324-NA (120-N-1) is presented in [Figure 4.2](#). Closure
43 activities (actual cleanup) for the 120-N-1 and 120-N-2 will begin in July 2001 and will continue for an
44 approximate duration of 15 months. The corrective action schedule of compliance for 100-N-58 will be
45 the same as the closure schedule.



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Figure 4.2. Closure Schedule for 1324-N and 1324-NA

1 **4.9 Amendment of Closure Plan**

2 The 1324-N and 1324-NA closure plan will be amended whenever changes in closure activities or
3 postclosure requirements occur and prior to certification of closure and postclosure, respectively, that
4 would constitute a Class 1, 2, or 3 modification to the Permit ([WAC 173-303-830](#)).

5 **4.10 Certification of Closure**

6 In accordance with [WAC 173-303-610](#)(6), within 60 days of closure of 1324-N and 1324-NA, RL will
7 submit to Ecology a certification of closure signed by both RL and an independent registered professional
8 engineer. The certification will specify that the units have been closed in accordance with specifications
9 contained within the approved closure plan as contained in the Permit.

10 **4.11 Survey Plat and Notice in Deed**

11 A survey plat will be submitted by RL to the Benton County Planning Department no later than 60 days
12 after certification of closure of each unit in accordance with [WAC 173-303-610](#)(10). Also, a notice in
13 deed will be submitted by RL to the Auditor of the Benton County no later than 60 days after certification
14 of closure of each unit in accordance with [WAC 173-303-610](#)(10). After submitting this notice, a
15 certification signed by the Permittees will be submitted to Ecology stating that notification has been
16 recorded along with a copy of the notice in deed. The notice in deed will specify the type, location, and
17 quantity of dangerous wastes remaining after closure actions have been completed.

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