# ADDENDUM H

# CLOSURE

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# H CLOSURE ACTIVITIES

The physical activities required to close 1301-N and 1325-N Liquid Waste Disposal Facilities in accordance with WAC 173-303-610 and the Permit will be integrated with the ROD for DOE/RL 96-39, Rev. 1A. The ROD and the remedial design for the selected alternative will specify further the closure activities that will be required for CERCLA remedial action. Closure activities necessary to comply with dangerous waste regulations and the Permit will need to be consistent with CERCLA activities. CERCLA activities will be required to include elements necessary for closure of a dangerous waste unit. The Closure Plan presents the physical remedial activities and the sampling and analysis required to comply with WAC 173-303-610 and the Permit for each of the remedial alternatives.

The closure activities are discussed in this section to highlight the site-specific elements of removal or characterization as clean of structures and piping for the 1301-N and 1325-N Liquid Waste Disposal Facilities. The other closure activities are not well defined for these sites at present but will be developed during the remedial design phase. Additional details about the alternatives can be found in DOE/RL-96-39, Rev. 1A, Section 5.2.

## H.1 Removal of Structures

The structures in 1301-N and 1325-N Liquid Waste Disposal Facilities include concrete structures and earthen basins, trenches, fencing and signage surrounding the units, and ancillary surface structures such as valve houses associated with piping.

### H.1.1 Earthen Structures

The contaminated soil in the earthen structures will be excavated by conventional earthmoving techniques. Removal technologies are described in DOE/RL-96-39, Rev. 1A, Section 5.1.3. Differing amounts of contaminated soils will be generated depending upon the remedial alternative selected for 1301-N and 1325-N. Alternatives that include soil removal are described in DOE/RL-96-39, Rev. 1A, Sections 5.2.1.5 through 5.2.1.8 for a residential exposure scenario and in DOE/RL-96-39, Rev. 1A, Sections 5.2.2.5 through 5.2.2.8 for a modified Columbia River Comprehensive Impact Assessment (CRCIA) ranger/industrial exposure scenario. After loading into containers, contaminated soils will be treated if necessary and/or disposed in an approved disposal facility on the Hanford Site. Particular attention will be given to the protection of workers and the environment from exposure to airborne contaminants during excavation and container loading. Dust mitigating measures, such as water sprays and chemical fixatives, may be employed to control fugitive dust emissions. The as low as reasonably achievable review will consider the use of shielding and/or remote handling techniques to reduce worker exposures from direct ionizing radiation.

The 1301-N Liquid Waste Disposal Facility demolition waste volumes are discussed in DOE/RL-96-39, Rev. 1A, Sections 4.5.1.1 and 4.5.1.2 for the earthen crib structure and DOE/RL-96-39, Rev. 1A, Sections 4.5.2.1 and 4.5.2.2 for the trench. The 1325-N unit demolition volumes are presented in DOE/RL-96-39, Rev. 1A, Sections 4.5.3.1 and 4.5.3.2 for the crib, and in Sections 4.5.4.1 and 4.5.4.2 for the trench. Waste volume tabulations are provided in DOE/RL-96-39, Rev. 1A, Appendix D.

### H.1.2 Concrete Structures

Alternatives that include removal of concrete structures are described in the DOE/RL-96-39, Rev. 1A, Sections 5.2.1.3 through 5.2.1.8, for a residential exposure scenario, and in Sections 5.2.2.3 through 5.2.2.8 for a modified CRCIA ranger/industrial exposure scenario. The concrete weir box in the 1301-N Crib will be removed as contaminated waste. Demolition of the structure may be necessary or advantageous prior to removal. Dust controls will be employed to control fugitive emissions during any demolition. The demolition waste volume of the weir box is discussed in DOE/RL-96-39, Rev. 1A, Section 4.5.1.3.

The concrete cover support beams and cover panels over the 1301-N Trench and 1325-N Crib and trench will be removed as intact components, if possible. Demolition activities, if required, will be minimized to maintain control of airborne releases and to simplify soil excavation in the trench. As with the earthen structure removal, particular attention will be given to the control of fugitive dusts and worker exposures to direct ionizing radiation. The demolition waste volume of the cover system is discussed in DOE/RL-96-39, Rev. 1A, Section 4.5.2.3for 1301-N Liquid Waste Disposal Facility, and in DOE/RL-96-39, Rev. 1A, Section 4.5.4.3 for 1325 N. Waste volume tabulations are provided in DOE/RL-96-39, Rev. 1A, Appendix D.

Demolition debris and solid wastes in the cribs and trenches potentially include demolished concrete, wooden poles, and netting. These materials will be removed during crib and trench excavation operations and disposed with the contaminated soils.

## H.2 Piping Removal or Characterization as Clean

The remediation of 1301-N and 1325-N Liquid Waste Disposal Facilities includes the excavation and removal of the contaminated piping systems that have not been characterized and determined to be clean (i.e., contain no dangerous waste constituents above residential MTCA Method B concentrations) between N Reactor and the cribs. Alternatives that include removal of piping are described in DOE/RL-96-39, Rev. 1A, Sections 5.2.1.3 through 5.2.1.8, for a residential exposure scenario, and in DOE/RL-96-39, Rev. 1A, Sections 5.2.2.3 through 5.2.2.8 for a modified CRCIA ranger/industrial exposure scenario. Two figures illustrate the potential extent of piping removal Pipe lengths and map references are provided in DOE/RL-96-39, Rev. 1A, Appendix D.

The buried pipelines will be unearthed by conventional excavation equipment. The exposed piping may be segmented for removal manually or by remote methods, depending on contact radiation exposures. Contamination controls will focus on the drainage of residual fluids in the piping prior to, and during, segmentation and on the control of airborne contamination during cutting and pipe handling operations. After the piping has been removed, the pipe bedding soil will be surveyed for residual contamination, excavated, and disposed as necessary.

## H.3 Sampling and Analysis Activities

### H.3.1 Past Soil Characterization Data

Data used to characterize the vadose zone soils were obtained from six boreholes drilled and sampled to support the 1301-N and 1325-N Liquid Waste Disposal Facilities limited field investigation (DOE/RL-96-39, Rev. 1A). DOE/RL-96-39, Rev. 1A, Figure 2-32 shows the locations of these boreholes. Two of the boreholes are adjacent to 1301-N Liquid Waste Disposal Facility (199-N-107A and 199-N-108A), one is next to 1325-N Liquid Waste Disposal Facility (199-N-109A), and three are located northwest of 1301-N Liquid Waste Disposal Facility (199-N-75, 199-N-76, and 199-N-80) between that facility and the river. Samples were obtained from near the surface to a depth of up to 30.2 m (99 ft). All of these data are presented in the limited field investigation.

In addition to the boreholes, sediment samples were collected from the 116-N-1 Crib. Data from these samples were not used in this evaluation because of insufficient QC associated with the sample collection process. Other soil samples have been collected from this vicinity, but most have only been analyzed for radionuclides.

Data indicate that chromium is the only metal of concern in vadose zone soils at 1301-N Liquid Waste Disposal Facility below 3.0/4.6 m (10/15 ft). Chromium exceeded background concentrations in data associated with 1301-N Liquid Waste Disposal Facility. Mercury is the only other metal that is included in the contaminants of concern (COCs), but no data from the boreholes at 1301-N and 1325-N Liquid Waste Disposal Facilities are available to evaluate the presence or absence of this analyte in vadose zone soils. Therefore, it is retained as a COC in surface soils (0 to 3.0/4.6 m [10/15 ft]). In DOE/RL-96-39,

Rev. 1A, Appendix G, mercury will not reach groundwater in 1,000 years. Therefore is not considered to be a constituent of concern for groundwater protection below 3.0/4.6 m (10/15 ft). Evaluation of nitrate concentrations in the soil is similarly limited because of a paucity of data, so that substance has been retained as a COC. Nitrate is a mobile constituent, and a nitrate plume exists in the groundwater. Therefore, nitrate is considered a COC for both surface and subsurface soils.

Data from the three boreholes located outside of these facilities indicate that no metals are above background values. One sample from the 150- to 180-cm (5- to 6-ft) interval in borehole 199-N-76 was analyzed for mercury, and its value is well below typical background concentrations. These data indicate that metals deposited in the TSDs did not migrate laterally in the vadose zone any substantial distance.

Sampling during remediation did not detect the presence of methanol in the soil. The Washington State Department of Ecology granted a contained-in determination for methanol in December 2000. The limited field investigation sampling was not analyzed for the presence of methanol, and methanol was not listed as detected in any other sampling efforts. Acetone, however, was detected in three samples collected from boreholes outside of the facilities, at concentrations up to 51 ppb. Organic analytes were not analyzed in samples collected within and adjacent to the TSD units; however, field screening using an organic vapor monitor did not detect any organic compounds. Acetone is a common laboratory contaminant, and most of the data reported by the laboratory either are at detection limit or are associated with a blank that contained detectable amounts of acetone. These circumstances cast doubt on the presence of detectable quantities of acetone in the wells outside the bounds of the TSD unit.

Additional sampling was performed in 1998 and is documented in the *Data Summary Report* (BHI 1999). Characterization of the sites was conducted through sampling in accordance with the *Sampling Analysis Plan for the 100-NR-1 Treatment, Storage, and Disposal Units During Remediation Closeout* (DOE 2000a).

### H.3.2 Characterization Activities to Determine Closure Option

A s*ampling and analysis plan* (DOE 2000a) has been developed to support site closure. As presented in Section 4.3 and in DOE/RL-96-39, Rev. 1A, Table 4-17, dangerous waste constituents are retained as constituents of concern in both surface soils and subsurface soils. All alternatives (other than the No-Action Alternative) will result in the removal of dangerous waste constituents above 3.0 m (10 ft) bgs for the modified CRCIA ranger/industrial exposure scenario and 4.6 m (15 ft) bgs for the rural-residential scenario. This will result in removal of all soils that could be contaminated at levels that present a direct exposure hazard as defined in MTCA. Verification sampling to determine MTCA direct soil exposure standard compliance will therefore not be required unless some areas around the units are not excavated and removed to the 3.0m and 4.6m level. Verification sampling will be performed on contaminants that may be present below 3.0 m or 4.6 m for the purposes of determining compliance with groundwater protection standards.

The Data Quality Objectives process was used (BHI 2000) to define the extent and type of sampling and analysis required during excavation and closure. This effort will define sampling issues, which may include analytes of interest, sample location, number of samples, number and frequency of field QC samples (i.e., trip blanks, equipment blanks, splits, and duplicates), sampling methodology, analytical methods, laboratory protocols, laboratory validation, data error tolerances, and data evaluation methods. This DQO effort will culminate in an Ecology-approved sampling and analysis plan.

Alternative-specific sampling and analysis activities are as follows:

RRES-6 and MCRIS-6

The Remove/Treat if Required/Dispose/Backfill (Removal) alternatives will require sampling and analysis at the end of excavation to determine that, at a minimum, a modified closure option has been attained. Dangerous waste constituents must be below MTCA Method C direct soil exposure and groundwater protection standards in order to preclude landfill closure and placement of a cover. Dangerous waste constituents must be below MTCA Method B direct soil exposure and groundwater protection standards in order to achieve remediation under RRES-6.

MCRIS-7

The Remove 3.0 m (10 ft) bgs/Treat if Required/Dispose/Backfill/Capping alternative will result in the placement of a WAC 173-303-compliant cover should dangerous waste constituents be left in place above MTCA Method C levels. Concentrations of dangerous waste constituents remaining under the units would be irrelevant to the need for placement of a landfill cover; however, to determine whether other landfill postclosure requirements should be imposed at one or both units, concentrations of constituent would need to be defined. Sampling would be required after excavation and/or prior to backfilling and placement of the cap for this alternative.

MCRIS-8

Sampling and analysis would be required for the Remove 3.0 m (10 ft) bgs/Treat if Required/Dispose/Vitrify (Vitrification) alternative to define the extent of contamination of the dangerous waste constituents needing treatment. Sampling after vitrification may be required in order to determine the effectiveness of the treatment for dangerous waste constituents.

In addition to the sampling described above, sampling may be performed during excavation to help define extent of contamination, to guide field activities, and for waste characterization to determine ex situ treatment and disposal requirements.

### H.3.3 Piping Characterization

Should a determination be made that piping associated with the 1301-N and 1325-N Liquid Waste Disposal Facilities may be able to meet clean closure standards and be left in place, such a determination will be submitted to Ecology for their concurrence. This determination may be based on process knowledge, sampling, or both.

## H.4 Waste Management

Closure of the 1301-N and 1325-N Liquid Waste Disposal Facilities in accordance with the remedial alternatives identified will generate low-level radioactive or mixed waste in the form of contaminated soils and debris. Disposal of these wastes will be performed at the Environmental Restoration Disposal Facility located on the 200 Area Plateau of the Hanford Site, in compliance with WAC 173-303 for any dangerous or mixed waste that will be generated. If generated wastes do not meet the acceptance criteria for these units, such as compliance with land disposal restrictions (40 CFR 268), a disposal plan will be developed to determine appropriate treatment or disposal options for these wastes. Waste generated as part of this remediation activity will be managed and disposed of in such a way as to ensure protection of human health and the environment.

Waste generation, management, and disposal will be conducted in accordance with operational procedures and with all State, Federal, and DOE Orders and regulations dealing with waste, including agreements with the public and stakeholders.

## H.5 Modified Closure Institutional Control Requirements

Should a modified closure option be determined for 1301-N and/or 1325-N Liquid Waste Disposal Facilities, institutional controls in accordance with Permit Condition II.K.3.a and WAC 173-340-440 shall be adhered to. Institutional controls consist of physical measures and administrative and legal

mechanisms. Possible methods of controlling access to contaminated sites include placement of signs, entry control such as locked fencing, artificial or natural barriers, and active surveillance. Measures to be used depend on specific site conditions and degree of hazard associated with contamination left at the end of remediation activities. Because of this, specific institutional controls cannot be detailed until after selection of an alternative and incorporation of design elements during the remedial design phase.

A notice in deed and survey plat will be submitted to the Benton County Auditor as described in Section 4.12.

## H.6 Final Cover Requirements for Landfill Closure

Should dangerous waste contaminants be left within the soil column above MTCA Method C levels, a landfill cover would need to be designed and constructed over the unit(s). Specific design aspects associated with a landfill cover would require development after the ROD and during the remedial design phase associated with 1301-N and 1325-N Liquid Waste Disposal Facilities.

## H.7 Personnel Training

Training will be provided to site personnel in accordance with the 1301-N and 1325-N Liquid Waste Disposal Facilities training plan contained in DOE/RL-96-39, Rev. 1A, Attachment A-4. This training will be effective until the postclosure period.

## H.8 Closure Contact

The DOE-RL will be the official contact for 1301-N and 1325-N Liquid Waste Disposal Facilities during the postclosure period at the following address:

Director, Office of Environmental Services *

U.S. Department of Energy
Richland Operations Office
P.O. Box 550
Richland, Washington 99352
*or its equivalent should there be a future reorganization at DOE-RL

## H.9 Closure Schedule

Closure activities (actual cleanup) for 116-N-3 will begin in July 2000.

At the completion of 116-N-3, closure activities at 116-N-1 will begin. Approximately 600 feet of piping that is associated with the 116-N-1 TSD Waste Site and the 116-N-2 Facility and support facilities (1322-NA, NB, NC) will be deferred until decontamination and decommissioning (D&D) of these facilities. This deferral is due to safety concerns with remediating the piping and the radiological dose exposure to remedial action workers. Remediation will require excavation of the earthen berm at the 116-N-2 Facility, which provides radiological shielding.

Additionally, approximately 5,600 feet of piping that is associated with 116-N-1, 105-N and 109-N Facilities (part of the N Reactor Facility Complex) will be deferred until D&D activities of the 105-N Reactor Facility Complex. This deferral is also due to safety concerns with remediating the piping. Remediation will require excavation up to foundation walls of these facilities, thus, jeopardizing the integrity of the facilities. The pipelines intersect and/or follow active underground power lines and potable water lines. Finally, remediation will block the access routes to the ongoing pump-and-treat operations at the 100-N Springs and other active facilities in the 100-N Area.

The approximate duration of completion for both TSD units is 6 years, not including for the piping that will be deferred. The D&D of the 116-N-2 Facility and support facilities and removal of the deferred piping is planned for startup in the fiscal year 2004. The deferred piping associated with the 105-N and

109-N Facilities will be remediated as part of D&D of the 105-N Reactor Facility Complex in accordance with Tri-Party Agreement Milestone M-093-20.

The corrective action schedule of compliance for UPR-100-N-31 will be the same as the closure schedule.

## H.10 Amendment of Closure Plan

The 1301-N and 1325-N Liquid Waste Disposal Facilities closure plan will be amended whenever changes in closure activities or postclosure requirements occur and prior to certification of closure and postclosure, respectively, that would constitute a Class 1, 2, or 3 modification to the Permit (WAC 173-303-830).

## H.11 Certification of Closure

In accordance with WAC 173-303-610(6), within 60 days of closure of 1301-N and 1325-N Liquid Waste Disposal Facilities, DOE-RL will submit to Ecology a certification of closure signed by both DOE-RL and an independent registered professional engineer. The certification will specify that the units have been closed in accordance with specifications contained within the approved closure plan, as amended, and as contained in the Permit.

## H.12 Survey Plat and Notice in Deed

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

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