

APPENDIX G.1

LEGACY SOURCE EVALUATION UNITS

Overview of Past Practices

Radiological and hazardous waste was generated throughout the nuclear fuel cycle at Hanford Site, from fabrication and testing of nuclear fuel elements in the 300 Area, to operation of the nuclear production reactors in the 100 Areas, to chemical extraction of plutonium and other special nuclear materials from irradiated fuel elements in the 200 Areas. Radiological and hazardous waste was managed using a number of waste disposal facilities. Gaseous waste was released to the atmosphere via tall ventilation stacks. Solid waste was disposed of in landfills (termed burial grounds), and liquid waste was managed using a number of different storage and disposal facilities. Low volumes of high-level (highly radioactive) liquid waste were sent to underground storage tanks. Some of this tank waste was reprocessed to remove uranium or high-activity fission products, and then disposed into single-use specific retention trenches. Intermediate-level liquid waste was routinely discharged to underground percolation facilities (cribs, tile fields, French drains) and reverse wells. High volumes of low-level liquid waste and cooling water were discharged to ditches and ponds.

In addition to planned waste disposal, radiological and hazardous materials were accidentally released to the environment through spills, leaks (e.g., from tanks or pipelines) or intrusion into contaminated areas. Processing and waste disposal operations also resulted in an expanse of contaminated buildings, equipment, pipelines, diversion boxes, and other infrastructure.

Legacy source sites evaluated include all past practice liquid waste disposal sites, buried solid waste sites, unplanned releases, and associated underground piping and infrastructure. These include associated near-surface and deep vadose zone contaminated sediments associated with these sites. They do not include the high-level waste storage tanks or their associated infrastructure, unplanned releases, and contaminated sediments, which are covered by the tank waste and farms evaluation. Nor do they include the contaminated processing plants or associated facilities and infrastructure that are covered by the deactivation, decommissioning, decontamination, and demolition of inactive facilities evaluation.

Evaluation of the legacy source sites will include, to the extent that information is available and clearly identifies uncertainties, a summary of the amount and physical-chemical-radiological nature of contamination and all relevant pathways (including potential to impact groundwater resources) using a conceptual site model for the combined inventories within each evaluation unit.

Although individual risk review templates have been prepared on virtually all Hanford Site EUs and are included as individual appendices to this final report, several legacy EUs and their associated templates have been consolidated based on their similarities in contaminants, sources, and disposal method. No risk review template was prepared for RC-LS-3 Pre-Hanford Orchard Lands. Thus, the risk review templates for the 21 legacy EUs discussed above will be found in 12 appendices, numbered G.2 through G13.

Comparing differences between the legacy waste sites in terms of their risks to human and ecological health necessitates consideration of the following:

- Quantity of radionuclide (in Ci) and chemical inventory of the contaminants
- Location of the contaminant relative to the soil surface and status of containment
- Mobility of the contaminant (sorbed, presence in vadose zone or groundwater)
- Whether cleanup work could cause unintended contact with the contaminant or its airborne release

- for Public or Maximally Exposed Offsite Individual (MOI), the distance between the initiating event and the Hanford boundary

The Legacy EUs can be grouped into liquid waste, solid waste, and other waste sites and evaluated with regard to current and long-term risk drivers.

Liquid Waste Sites:

- Appendix G.5 (CP-LS-1 to CP-LS-4, CP-LS-6, CP-LS-8 to CP-LS-10)
- Appendix G.6 (CP-LS-5 and CP-LS-11)

Most of the individual sites represent significant near-surface vadose zone risks to groundwater. The 200 West pump-and-treat system is remediating groundwater that may have been impacted by EUs CP-LS-2, 3, 4, and 6, but no treatment system is available for contamination from liquid waste sites in the 200 East Area. There is no current human health risk to workers or the public at any of these sites and no decisions have been made regarding future remediation strategies.

Solid Waste Sites:

- Appendix G.2 (RC-LS-1)
- Appendix G.4 (RC-LS-4)
- Appendix G.7 (CP-LS-12 and CP-LS-14)
- Appendix G.12 (CP-LS-18)

The 618-10 and 618-11 Burial Grounds represent the highest risk among the 21 legacy waste sites. They contain Cs-137, Sr-90, Pu, Am-241, and other radiological contaminants, including pyrophoric wastes. The high-activity wastes were disposed of in VPUs, caissons, and concrete/lead-shielded drums, with the low-activity wastes buried in trenches, but specific quantities and locations were poorly characterized. Special handling procedures to minimize unexpected explosions or fires are being used with each drum unearthed, and a unique auguring method is being used to remove each VPU and its waste contents at the 618-10 site. TRU waste are being separated out and temporarily stored until they can be transferred to WIPP. Characterization activities at the 618-11 Burial Grounds and eventual remediation of the site are being made more difficult because the site borders the privately operated the Columbia Northwest generating station.

Although the 200 East and West Burial Grounds contain the largest quantities of Cs-137, Sr-90, tritium, or H-3 among the legacy EUs, there is no information to indicate that these sites currently represent a risk to human health, as there is little or no worker activity at the sites and the area is restricted from public access. No decisions have been made regarding the future cleanup of these two burial grounds, and DOE is not required to submit a RCRA Facility Investigation/Corrective Measures Study & Remedial Investigation/Feasibility Study Report and Proposed Corrective Action Decision/Proposed Plan for the 200-SW-2 OU to Ecology until January 31, 2023.

Other Sites:

- Appendix G.3 (RC-LS-2) – K-West Area
- Appendix G.8 (CP-LS-13) – miscellaneous waste
- Appendix G.9 (CP-LS-15) – miscellaneous waste
- Appendix G.10 (CP-LS-16) – grout vaults

- Appendix G.11 (CP-LS-17) – soil contamination
- Appendix G.13 (CP-LS-7) – 200 Area Transfer Pipeline

Based on the information available, these six evaluation units represent the lowest risk among the 21 legacy EUs. Soils in the K-West Area contain small amounts of radiological contaminants that represent low worker risk. Two (200 East and 200 West Area miscellaneous waste sites) lack sufficient information with which to determine the long-term human health and ecological risks of doing nothing. Contaminant inventories are available for only 3 individual sites out of the 168 contained in these two EUs. Of the five grout vaults that were constructed, four were never used and are empty, and the fifth contains low-level waste contained in a cement grout. Contaminations of surface soils in the BC control area are in small hot spots that are widely dispersed across about 3,500 acres and sufficiently marked if DOE decides to remediate them.