APPENDIX I

Site Operations

Commercial Low-Level Radioactive Waste Disposal Site

Richland, Washington

Description of Site Operations

at the

Commercial Low-Level Radioactive Waste Disposal Site

Washington Department of Health

June 25, 2000

CONTENTS

INTRODUCTION

Operational requirements at the commercial low-level (LLRW) disposal site are listed in the Washington State radioactive materials license, WN-1019-2, issued by DOH to US Ecology, Inc (US Ecology). Additional procedures are listed in the Commercial Low-Level Radioactive Waste Disposal Facility Standards Manual. The US Ecology license is updated regularly and reissued on a five-year cycle. The following describes the current operations at the commercial LLRW disposal site.

1.0 Waste Inspections

There are two types of waste inspections required for the commercial LLRW disposal site. They are point-of-origin Inspections and onsite Inspections.

1.1 Point-of-Origin Inspections

The Washington Department of Health (DOH) began the Point-of-Origin Inspection Program in 1992. The goal of the program is to identify any deficiencies at generator facilities *prior* to waste being shipped for disposal. Identifying deficiencies before the waste is shipped will reduce subsequent packaging or waste form violations upon receipt at the commercial LLRW disposal site. DOH achieves this goal through random inspections of generator facilities. Washington is currently the only state in the nation that conducts point-of-origin inspections. This program was used as a basis for a Model Inspection and Verification Program (DOE/LLW-185) that was developed as guidance for other states.

1.2 Onsite Inspections

DOH has a full time onsite inspector at the commercial LLRW disposal site. US Ecology is required by license to inspect at least 20% of the containers on each shipment for physical integrity, marking and labeling requirements, and correlation with the shipment manifest. A waste form confirmation program is also in place at the facility. This program requires US Ecology to inspect a minimum of one shipment per week. Shipments that undergo this inspection are set aside, and all packages are individually examined using nondestructive testing. At least one of these packages is opened and/or punctured in the presence of a DOH inspector to determine compliance with waste form requirements.

In addition to the inspections noted above, both US Ecology and DOH inspect trucks entering the facility for compliance with U.S. Department of Transportation (USDOT) regulations. The USDOT requirements address such things as shipment and package radiation levels, physical integrity of containers, and paperwork.

2.0 Waste Handling and Disposal

2.1 Packaging

Packaging refers to the types of containers in which the waste must be placed for transporting and disposing. Container requirements have changed over the last 30 years. In the past, cardboard and wood packaging was allowed. Current containers are typically 55-gallon steel drums and steel boxes. There are packaging requirements for both waste stability and waste isolation. Unstable waste must be placed in approved containers such as high integrity containers (HICs) or engineered concrete barriers (ECBs). Packaging requirements for waste isolation focus on package integrity. Containers received for disposal at the facility cannot show significant deformation, degradation, or any signs that radiation has dispersed through the container.

2.2 Waste Forms

DOH has specific requirements on the form in which waste must be before it can be disposed. For example, liquid wastes must be processed to eliminate all freestanding liquid and rendered non-corrosive. Solid material containing incidental liquids are allowed, provided that the dry material contains less than 0.1% volume percent of liquid within the package.

Other wastes subject to specific form requirements include all Class B and C waste, radioactive consumer products, chelated wastes, biological wastes, and Class B tritium wastes. Void spaces within all classifications of waste must be reduced to the extent practicable. However, void spaces in Class A stable, Class B, or Class C waste may not exceed 15 percent of the total volume of the waste package, unless disposed of in a HIC.

3.0 Trench Design

The commercial LLRW site uses conventional shallow-land burial. Shallow-land burial uses large, unlined trenches for waste disposal. The maximum dimensions allowed for any trench is 150 feet (46 meters) in width, 45 feet (14 meters) in depth, and 1000 feet (305 meters) in length. Soils excavated during trench construction are used for backfilling, surcharging, and construction of berms. A registered professional land surveyor documents the trench location, and a geologist prior to waste emplacement performs a visual inspection of the trench walls.

4.0 Waste Emplacement And Backfilling

4.1 Emplacement

Wastes placed in steel boxes are stacked in trenches in an orderly manner, while drums may be placed in the trench more randomly. Wastes must be emplaced in a manner

that maintains the container integrity during emplacement, minimizes void spaces between containers, and permits the void spaces to be back filled with site soils. Certain wastes must be segregated. Class A Unstable waste is segregated from other wastes by placing it into separate trenches. Class C waste is required to be disposed at least five meters below the surface. Wastes with a surface radiation level greater than 10 R/hr must also be disposed at a minimum depth of five meters below natural grade. Wastes containing chelates in excess of 0.1 percent by weight must be segregated from other wastes by placing them into ECBs. Gas containers must be placed in a manner that maintains package integrity, and with a minimum of ten feet between other gas containers.

Wastes can only be held in storage for a maximum of 90 days. Storage of waste is monitored so that exposures are maintained as low as reasonably achievable and the dose limits are not exceeded.

4.2 Backfilling

Backfilling between waste containers must be done frequently enough so the radiation level at the trench edge does not exceed 5.0 mrem/hr. If possible, backfilling is to be performed concurrent as the wastes are placed in the trench. At a minimum, backfilling is required so the maximum unburied depth of Class A unstable waste is approximately two times the maximum package dimension. At no time is the uncovered depth of waste allowed to exceed six feet.

For Class B and C waste and wastes with specific package segregation requirements, backfilling is required so each layer is covered prior to subsequent waste emplacement. More frequent backfilling may be performed to minimize radiation exposures.

5.0 Manifest Tracking and Record Keeping

Each shipment of LLRW and Naturally Occurring and Accelerator Produced Material (NARM) arriving at the commercial LLRW disposal site is required to have shipping documents properly completed by the generator. Each generator using the commercial LLRW disposal site must also have a valid site use permit issued by the Washington State Department of Ecology prior to shipping any waste for disposal.

US Ecology's license requires that waste shipments arriving at the disposal facility be accompanied by a shipment manifest approved by the Washington State Department of Ecology, a Washington State Patrol vehicle inspection certificate, and a copy of a current indemnification certification. DOH requires that each manifest contain a detailed physical and chemical description of the waste, including the identity and quantity of radionuclides. The shipper must certify the material is properly classified, packaged, and labeled for transport and disposal.

The onsite inspector reviews all shipping papers prior to acceptance of the shipment for disposal. No shipment may be off-loaded unless the inspector has stamped and

initialed the paperwork. A copy of the manifest accompanies the waste shipment to the trench for off-loading. During the disposal process, the inspector records which trench the load was placed in, depth of waste burial, three-dimensional location of Class B and C waste, and the date of disposal. Detailed reports on waste disposal are required monthly, annually, and whenever a trench is closed.

6.0 Interim Closure

As trenches are filled to within eight feet of natural grade. A minimum of eight feet of site soils and six inches of gravel are placed over the trench. The interim trench cover is not considered a low-permeability cover. Interim trench markers are installed at each end of the trench, inscribed with total activity, trench number, dates of operation, the volume of waste in the trench, and the coordinates of the disposal unit. A registered professional land surveyor surveys the trench, and the record of the trench is maintained on a scaled engineering topographical map.

Each quarter, visual inspections and radiation surveys of completed disposal units are done to determine the condition of trench caps, changes in radiation levels, general condition of the disposal facility, and status of security measures.

7.0 Stormwater Management

The commercial LLRW disposal site has a water management diversion channel designed to control surface water drainage. The channel was built in response to a 1985 storm, which resulted in excess stormwater at the site due to frozen ground conditions. The diversion channel is engineered to accommodate a 100-year storm event, including rain on frozen ground events. The diversion channel is designed to minimize surface erosion, prevent run-on onto trenches, and limit contamination resulting from run-on and run-off.

8.0 Institutional Controls

Institutional controls are used to secure and control the commercial LLRW disposal site. In addition to the security provided by the U.S. Department of Energy Hanford Site, the commercial LLRW disposal site is surrounded with a continuous eight-foot high chain link fence that is topped with barbed wire. The entire fence is posted for radiation areas. The entrance gate to this area is under direct surveillance during working hours and is locked after working hours.

9.0 Environmental Monitoring

Beginning in 1965, soil, groundwater, and vegetation monitoring have been performed periodically. Air quality monitoring began in 1978. Ambient air and other experimental monitoring began in the mid-980s. In 1987, a comprehensive environmental monitoring plan was initiated. Today there are nine permanent environmental monitoring stations surrounding the commercial LLRW disposal site, with several other stations throughout

the site. Table 1 lists monitoring requirements included in the US Ecology license. Reporting levels, established in the license for each of the monitoring requirements, are based on the protection of public health. US Ecology publishes an annual environmental report documenting results of the previous years monitoring.

Table 1: US Ecology Environmental Monitoring Requirements

Media Sampled	Sample Sites	Sample Frequency	Constituents Sampled
Soil	9 stations, plus the NE and NW corners	Quarterly	Gross beta, total uranium, isotopic plutonium, Co-60, Cs-137, and gamma spectroscopy
Vadose Zone	3 vadose zone wells	Quarterly at depths of 35 ft.	Toluene, xylene, methane and combustible gases, Ra-222, and H-3
Groundwater	7 wells – 3 wells upgradient and 4 wells downgradient	Quarterly	Gross alpha, gross beta, H-3, C-14, Pu-238, Pu-239/240, Co-60, Cs-137, total uranium, gamma emitters, total dissolved solids, total organic carbon, nitrates, temperature, and specific conductance
Air Quality	9 stations	Continuous, weekly, and monthly	Gross beta, gross alpha, I-125, H-3, Co-60, and Cs-137
Ambient Air	Perimeter of site and fence-line near active trenches	Monthly, quarterly	Penetrating radiation
Vegetation	9 stations, NE and NW corner, and trench covers	Annually	Gross beta activity, total uranium, isotopic plutonium (Pu-238 and Pu-239/240), Co-60, Cs-137, H-3, and gamma spectroscopy

10.0 Personnel Training

The commercial LLRW disposal site has a formalized written training program developed by US Ecology and approved by DOH. The training program is reviewed and updated at least every two years. The program includes specific hours of classroom study, on-the-job training, and testing requirements for radiological workers, management, and unescorted visitors.

11.0 Emergency Response

US Ecology's *Radiological Contingency Plan* (RCP) outlines the actions to be taken if there is a significant release of radioactive materials to the environment at the commercial LLRW disposal site. The RCP contains detailed procedures for notification and response in case of a radiation emergency. A radiation emergency is defined as:

- fire
- major release of radioactive materials to the air, soil, or ground water
- transportation accident
- any event requiring evacuation

- any other hazardous materials event involving radioactive materials

To ensure readiness in case of an emergency, DOH performs periodic emergency drills at the commercial LLRW disposal site. The drills are unannounced and consist of at least three drills per year. The drills cover areas such as fire, release of radioactive material, and care of a contaminated injured person.