

**APPENDIX 6.1.1-1
WCS LLRW DECOMMISSIONING AND
SITE CLOSURE PLAN**

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1.0 INTRODUCTION

The WCS Low-Level Radioactive Waste (LLRW) Disposal Facility has been designed to meet the performance objective of 30 TAC §336.723. To do this, 32 design criteria [found in License Application (LA) Section 3.1.2] were established, and several of these are directly related to the goal of minimizing post-closure maintenance and supervision. For example, Design Criteria G2 is that “Design features shall be directed toward long-term isolation” and Design Criteria G8 is that “Engineered features shall not required long term maintenance after closure.” These, and other, criteria directed the WCS design to favor simple, reliable, passive features for incorporation, rather than complex or active systems. Therefore, by creating simple, reliable, and passive features, the design of the WCS site is such that decommissioning and closure activities will be minimized and the site will require little or not long-term active maintenance. Consideration of erosion due to the probable maximum precipitation (PMP) has been incorporated into all calculations involving the final closure cover design of the LA.

Closure of the WCS LLRW site continues as an ongoing process throughout the operational period. This will entail closing each of the disposal cells as they are filled. This will be done following ALARA principles. The final closure of the site will include a number of activities to be accomplished after all waste is received and the operational period is completed. Demolition and removal of surface structures, modification of surface water and erosion controls, and removal of site access roads, final disposal cover installation over the three remaining open disposal cells, and installation of permanent markers will be accomplished during the closure period.

The requirements for closure include the following:

- Minimize the need for future maintenance
- Control, minimize, or eliminate post-closure escape of radioactive constituents, leachate, contaminated runoff, or decomposition products to groundwater, surface water, and the atmosphere
- Promote positive drainage from the site and minimize erosion or abrasion of the cover
- Comply with radionuclide concentration and inventory limits
- Release the undisturbed support areas for unrestricted use

The Decommission and Site Closure Plan will remain open to revision based on actual, verified conditions through the end of the operational period. Therefore, this Decommissioning and Site Closure Plan is intended to contain important plans and procedures, but the detail of the final site characteristics cannot be entirely known at this time. Therefore, the Decommissioning and Site Closure Plan will be modified periodically throughout the operations phase of the WCS LLRW Disposal Facility and finalized prior to the start of the closure period. This Decommissioning and Site Closure Plan was developed and follows guidance from NUREG-1757, *Consolidated NMSS Decommissioning Guidance*.

The WCS Site will be closed to meet the regulatory requirements and standards for the decommissioning process of 30 TAC §336.605 and 30 TAC §336.724. 30 TAC §336.605 prescribes that the acceptable surface contamination limits for facilities, equipment and materials of 30 TAC §336.364 will be used. In addition, porous materials (e.g., concrete) may be released for unrestricted use if the radionuclide concentrations do not exceed the previously specified

surface contamination limits, and the limits specified for soil in 30 TAC §336.356(a) and 30 TAC §336.603. 30 TAC §336.724 will apply to soil surface contamination. The WCS site will be prepared, executed, and documented for closure to meet these termination screening values.

1.1 Executive Summary

The LLRW Site is owned and operated by Waste Control Specialists (WCS). Detailed information about the licensee or owner and its location are provided in Section 1 of the LA and outlined below:

Name and address of the Operator (Licensee):

Waste Control Specialists LLC
Three Lincoln Center
5430 LBJ Freeway, Suite 1700
Dallas, TX 75240
Telephone Number: (972) 450-4233

Facility Name and Address:

Waste Control Specialists LLC
9998 West Highway 176
Andrews, TX 79714

Mailing Address:

Three Lincoln Center
5430 LBJ Freeway, Suite 1700
Dallas, TX 75240

The disposal facility accepts commercial LLRW from the states in the Texas Compact and LLRW and mixed LLRW from the U.S. Department of Energy. These wastes are disposed in two separate facilities; the Compact Waste Facility (CWF) consisting of one Canister Disposal Unit and the Federal Waste Facility (FWF) consisting of a Canister Disposal Unit (CDU) and a Non-Canister Disposal Unit (NCDU).

A description of the waste streams and waste inventory (e.g., types and volumes of LLRW from each waste source, concentration and total inventory of radionuclides from each waste source, and identification of principal radionuclides of regulatory concern) is provided in Section 8.2 of the LA and summarized in Table 8.2-1 for the CWF and Table 8.2-2, of that section, for the Federal Waste Facility Canister Disposal Unit (FWF-CDU) and the Federal Waste Facility Non-Canister Disposal Unit (FWF-NCDU).

The waste acceptance requirements and any limitations imposed on waste receipt, form, packaging, radionuclide concentration, or total inventory for the disposal site or a specific radionuclide are outlined in Section 5.2.1 and Appendix 5.2-1 of the LA.

2.0 FACILITY OPERATING HISTORY

As operations are conducted, this section would outline the operating history of the facility from construction through the life of the disposal unit and into closure. This section will be updated with each license renewal to ensure that the operating history is accurate and correct.

2.1 License Number/Status/Authorized Activities

The license, once issued, will be identified in this section. All authorized activities will be identified and summarized in this section. Included for each radionuclide will be maximum activities and chemical forms of radionuclides authorized for disposal in the facilities. All radionuclides on site at the end of the closure period will be confined in canisters or bulk disposal and covered with an engineered cover system. A scaled map of the disposal units is found in Drawing C0.11 of the LA. It depicts the final contours of the cover system and the location of interred waste.

2.2 License History

As the WCS license is amended, the license history throughout the life of the facility into the closure period will be summarized in this section.

2.3 Previous Decommissioning Activities

Any previous decommissioning activities conducted prior to entering the closure period will be described. None are currently anticipated as all decommissioning activities will occur at the time of closure of the facility. Should a building or structure outlive its usefulness, it will be decommissioned using the criteria outlined in this decontamination plan prior. Records will be maintained and archived as part of previous on-site activities.

2.4 Spills

As WCS operations are conducted, a summary will be maintained of areas at the site where spills (or uncontrolled releases) of radioactive materials have. This will include the types, forms, activities, and concentrations of radionuclides involved in the spill or uncontrolled release. Scale drawings or maps of the site, facilities, and environs showing the location of spills will be developed.

Response to spills will be performed using procedures found in Appendix 5.5, namely LL-OP-9.6, "Overpacking Waste Containers," LL-OP-9.7, "Spill Response," LL-OP-9.8, "Non-Routine Operations." This section will be periodically updated to identify and describe these past spill areas.

2.5 Prior On-Site Burials

No on-site burials of waste will be allowed or is anticipated other than the actual licensed disposals within the CWF, FWF-CDU, and FWF-NCDU. Records of these disposal unit operations will be maintained and include types, forms, activities, concentrations and locations of waste and radionuclides in disposal units.

3.0 FACILITY DESCRIPTION

3.1 Site Location and Description

The WCS disposal site is approximately 31 miles west of the City of Andrews, Texas, and six miles east of the City of Eunice, New Mexico. The proposed disposal facilities are located approximately one-half mile east of the Texas-New Mexico State boundary and one mile north of Texas Highway 176. Section 2, Attachment E of the LA shows the location of the facility Site with respect to known or easily identifiable landmarks. The map illustrates county boundaries, highways, and major roads. The main access route is via Texas State Highway 176 from the south. The maps of the site also indicate contours and features of the site, elevations, rivers and lakes, topography, and facilities pertinent to the site.

3.2 Population Distribution

The demography and socioeconomics of the site are found in Section 2.2 of the LA. Included is a summary of current population and projected population growth of the site. At the time of closure this data will be updated to reflect current conditions.

3.3 Current/Future Land Use

Current land use of the surrounding facility is detailed in Section 2.2.1 of the LA. Figure 2.2.1-1 in the LA shows the location of the proposed facilities and the land use within a five-mile radius surrounding the property. Land use consists of oil producing wells, livestock grazing, and a rock quarry. At the time of closure these data will be updated to reflect current conditions.

3.4 Meteorology and Climatology

Meteorological data have been collected on the WCS Site to meet two primary goals. First, precipitation and evaporation data have been collected for determining a water balance for the proposed disposal site. Second, air quality data have been collected for monitoring for potential air releases. Details of the meteorology and climatology are found in Section 2.3.1 of the LA.

Meteorological data will continue to be collected during operations. This section will be updated periodically to reflect elapsed time over the site.

3.5 Geology and Seismology

Geology and seismology for the facility are detailed in Section 2.5 of the LA. The Site is underlain primarily by the Late Tertiary/Quaternary-aged pedogenic caprock caliche that developed on all pre-Quaternary strata on the High Plains. Quaternary Blackwater Draw eolian sands and younger windblown sands overlie the caprock caliche in the northern and southern parts of the WCS property. Below the caprock caliche are sands, gravels, and sandstones variously ascribed to the Tertiary Ogallala Formation, the Tertiary-aged sections of the Gatuna Formation, and the Cretaceous Antlers Formation.

The WCS property is located over a geologic feature referred to as the red bed ridge (Appendix 2.6.1, Figure 6.4-19b). The buried ridge occurs on the upper surface of the Triassic Dockum Group and extends for at least 160 km from northern Lea County, New Mexico through western

Andrews County and into Winkler and Ector Counties, Texas. Appendix 2.6.1, Section 4.1.1.4 provides additional discussion of the structural setting and development of the buried red bed ridge.

The Central Basin Platform, the predominant regional geologic structural feature, is an area of moderate, low intensity seismic activity.

3.6 Surface Water Hydrology

Surface water hydrology is outlined in Section 2.4 of the LA. The WCS Site is located in a semi-arid region. There are no perennial streams flowing through or adjacent to the Site. Several surface water bodies, both ephemeral and perennial, have been identified within five miles of the Site (Figure 2.2.1-2). The ephemeral water bodies include playas, which hold surface water for short periods of time following heavy or sustained rainfall events.

3.7 Groundwater Hydrology

Section 2.7 of the LA describes the groundwater hydrology of the Site. The basic geologic and hydrologic system components affecting groundwater transport including communication between water-bearing zones are schematically shown in Figure 2.5.1-1. A site conceptual model is included in Appendix 2.5.1. The geologic and hydrogeologic interpretations are provided in detail in Appendix 2.6.1.

3.8 Natural Resources

The known natural resources in the vicinity of the site are subsurface petroleum product exploration and production over the past 75 years and sand and gravel that are being produced for aggregate at an area approximately one-half mile west of the WCS site. Detailed descriptions of these natural resources are located in Section 2.8 of the LA.

4.0 RADIOLOGICAL STATUS OF THE FACILITY

Information on the quantities, types, and physical, chemical, and radiological characteristics of waste that will be generated during decommissioning is described in this section. It is not expected that any chemical hazardous waste will be generated during closure. The only chemically hazardous waste on site is that received during the operational phase of the facility. Should hazardous chemicals be used during operations, the waste will be classified in accordance with RCRA and disposed of as they are generated in accordance with RCRA requirements and WCS' other permits. It is not anticipated that there will be any quantities of hazardous wastes on-site at the time the closure period starts.

Typical waste generated during decontamination activities includes equipment that cannot be decontaminated, contamination found on concrete floor slabs that must be scabbled or demolished in order to remediate it, solidified decontamination solutions, strippable coatings, wipes and sorbents, PPE related to decontamination, piping, HEPA filtration units, FRP panels, and concrete rubble from decontaminating buildings. Table 6.1.1-1-1 lists the types of waste anticipated to be generated during closure. Use is made of the appropriate waste stream names and descriptions used to characterize waste streams in Appendices 8.0-1 and 8.0-2.

Table 6.1.1-1-1. LLRW Disposal Facility Decontamination Waste

Waste Stream	Waste Types
DECONRS	Solidified decon solutions
	Spent IX resins/filter media
	Total DECONRS
COTRASH	Strippable coatings/cavity paint residues
	Decontamination wipes and sorbents
	PPE related to D&D
	Drape plastics and masking tape
	Counting smears and plastic packaging
	Total COTRASH
NCTRASH	Contaminated ducts, piping or hoses
	Concrete rubble
	HEPA filtration units
	FRP panels
	Road base material
	Leachate tanks
	Total NCTRASH

The wastes listed in Table 6.1.1-1-1 will be handled on a disposal unit basis and disposed of in the appropriate disposal cell. FWF decontamination and decommissioning waste will be disposed in the FWF. CWF decontamination and decommissioning waste will be disposed of in the CWF.

4.1 Contaminated Structures

It is recognized that at facility closure one or more of the facility buildings and structures may remain to support post-closure activities; however, this plan assumes that all facility buildings and structures will be demolished during the closure period. This will include:

- Laboratory/Count rooms
- Decontamination buildings
- Waste staging buildings
- Leachate tanks

In addition to the above contaminated structures, four non-contaminated structures will be demolished at this time. These are:

- Truck scales
- LLW Office/Administration/Operations building
- Gate Building/Guardhouse
- TCEQ Office Building

Building demolition includes removal and disposal of the building's structure, remaining equipment, and the foundations and floor slabs. Building-specific work plans will be developed for permanent buildings, if removal is requested.

The waste staging, decontamination, and laboratory buildings might have contamination associated with their floors, drains, and HEPA systems. It is assumed that leachate tanks and associated piping are also contaminated. It is assumed that the Gate Building/Guardhouse, truck scales, WCS administration building and the TCEQ office building will be uncontaminated. These assumptions will be updated and changed based on actual conditions throughout the operational period. Any appurtenances to the building found to be contaminated will be disposed in the open disposal cell during closure. Areas and components of the building that are uncontaminated, and can be demonstrated as such through release surveys, could be reused by others or removed off site for disposal at conventional local landfills. However, the disposal and decontamination plan at this point in time, conservatively assumes that all building rubble and debris will be disposed of in the existing LLRW disposal units.

Tanks used in the controlled areas for the collection and storage of contaminated water will be demolished and disposed of on site in the appropriate CWF or FWF disposal unit, independent of the final radiation surveys for these tanks. Some or all of the tanks may be required to remain in use on site following closure for post-closure activities; however, this report assumes for the purposes of estimating quantities and costs that all tanks will be removed at some point in time during the closure period.

Table 6.1.1-1-2, Table 6.1.1-1-3, and Table 6.1.1-1-4 list the buildings and structures in each facility and the quantity of waste expected to be generated. These estimates are contained in calculation packages generated to determine the costs of the final disposal and are provided in Confidential Annex 2. All wastes are assumed to be Class A, or non-radioactive. For this plan, WCS has assumed that all wastes are potentially Class A and are disposed of in the respective FWF or CWF disposal units.

Table 6.1.1-1-2. CWF Potential Class A Waste Quantities During Closure

Building/Structure	Waste Volume (cy)	Reference Calculation
Steel Tanks	138	4.3.3
Staging Building	531	4.3.4
Decontamination Building	295	4.3.5
Tank Enclosure Structure	939	4.3.6
Footings/Foundations	465	4.3.7
Roads	363	4.3.8
TOTAL Volume	2,731	

**Table 6.1.1-1-3. FWF-CDU Potential Class A
Waste Quantities During Closure**

Building/Structure	Waste Volume (cy)	Reference Calculation
Steel Tanks	207	4.8.3
Footings/Foundations	1,409	4.8.4
TOTAL Volume	1,616	

**Table 6.1.1-1-4. FWF-NCDU Potential Class A
Waste Quantities During Closure**

Building/Structure	Waste Volume (cy)	Reference Calculation
Steel Tanks	138	4.8.3
Decontamination Building	256	4.7.2
Intermodal Building	1,719	4.7.3
Staging Building	628	4.7.4
Tank Enclosure	939	4.7.6
Footings/Foundations	1,257	4.8.4
Roads	641	4.7.7
TOTAL Volume	5,578	

The assumption for this estimate is that all structures and appurtenances will be disposed of as contaminated waste in the CWF, FWF-CDU, or FWF-NCDU disposal cells. Capacity for disposal of final volumes will be made in each disposal unit and is depicted in Drawings C1.13 through C1.19 for the CWF and Drawings C2.38 through C2.44 for the FWF-NCDU and FWF-CDU.

4.2 Contaminated Systems and Equipment

All site services, including water piping and electrical distribution systems will be dismantled and removed from the site. If removal of these items yields uncontaminated salvageable value, then they will be salvaged. Otherwise, they will be disposed off site at a municipal waste landfill. If any of the items discussed below are found to contain radioactive contamination, then they will be disposed of on site. For the purpose of the closure cost estimate, it is assumed that all site services will be disposed within the existing disposal units. The systems described below are a part of the quantities determined in the previous tables.

4.2.1 *Electrical Power Distribution System*

Removal of the electric power distribution system will include removal and disposal of the following:

- Substations and foundation slabs
- Duct banks including excavation and backfill

- Manholes including excavation and backfill
- Utility poles

4.2.2 Storm and Sanitary Sewer Piping

Removal of storm sewer piping includes removal and disposal of the piping, manholes, and catch basins. This includes the excavation and backfilling. Sanitary sewer piping is part of the buildings and will be removed with the buildings.

4.2.3 Fire Protection Water Piping

Removal of potable water piping includes removal and disposal of the piping, and excavating and backfilling where pipes were removed.

4.2.4 Underground Holding Tanks

Removal of utility piping includes the removal and demotion of underground holding tanks. This includes excavation and backfilling.

4.3 Surface Soil Contamination

Following the end of the operations phase, a number of surface features will be modified or removed.

4.3.1 Removal of Soil

At the end of the operational period, a survey of the soil within the LLRW facility boundaries will be conducted to delineate any areas of contaminated soil. If there is a spill onto the soil during the operational period, it will be immediately cleaned up along with uncontaminated soil, according to Appendix 5.5, LL-OP-9.7, "Spill Response." This survey will be done according to the procedures given in Appendix 5.5.2-1, "Radiation Safety Program and Procedures," specifically LL-RS-3, "Contamination Survey Techniques." If an area of soil is found to be contaminated, it will be removed and disposed in a disposal cell before the cell is finally closed, and replaced with uncontaminated soil and graded to meet final site contours (See Drawings C1.04 and C2.05).

4.3.2 Roadways and Paving

Unnecessary access roads will be removed. Paved areas will be rubblized and removed to reduce sheet flow erosion in the former receipt inspection area. Other unpaved roads on-site will be tilled and re-contoured to match existing site contours. Curbs will be removed and the rubble disposed. All graveled roads and storage areas will be removed and the debris disposed (see the final grading plan in Drawing C0.11). All contaminated rubble generated from road removal will be disposed in the LLRW disposal units regardless of roads within the control area or outside of controlled areas.

4.3.3 Revised Surface Water Controls

Surface water controls and conveyance channels will be removed. The site will be final graded to minimize the potential for run-on and run-off water to come in contact with the waste disposal

units (see the final grading plan in Drawing C0.11). Removal of these features will not generate any radioactive waste requiring disposal in either the CWF or FWF.

4.3.4 *Estimated Quantities of Contaminated Soil*

Quantities of soil estimates to be disposed of in the CWF and FWF disposal cells are based on demolition and removal of the roads. The road area calculation is performed using the CAD drawings developed for all roads. A depth of six (6) inches is assumed, multiplied by the road surface areas to obtain the volume of soil and rubble for disposal. Roads with contamination associated with the CWF will be placed in the CWF disposal cells and roads with contaminations associated with the FWF will be placed in their respective disposal cells. A conservative assumption is made that 10% of road will be contaminated and require disposal in the CWF or FWF. Volumes for roads are shown in Table 6.1.1-1-2 and Table 6.1.1-1-4 for the respective CWF and FWF disposal cells.

4.4 Subsurface Soil Contamination

No subsurface soil contamination is anticipated throughout the life of the facility. The requirements set for radioactive contamination burial at the site preclude any materials with water which will prevent contamination spills and incidences from contaminating subsurface soils. As any incidences occur they will be monitored, characterized, and cleaned up according to existing procedures developed. Should subsurface soil contamination resulting from a spill ever occur, the incident will be thoroughly investigated and remediated with a record kept as part of the site history. A volume of subsurface soil will be excavated with the roads (one foot total) as described above in Section 4.3.4.

4.5 Surface Water

Surface water at the site will be prevented from coming in contact with the waste. Runoff water that does come in contact with waste will be collected according to designs in Section 3 of the LA and be monitored for contaminated materials. Contaminated waters existing at the time of closure or generated during closure will be shipped off site for treatment and disposal.

Water collected on site will be placed in the site tanks, circulated to suspend sediments and filtered to remove sediments. The water will be tested and sent off site for treatment or disposal. It is expected that, at the time of closure, water will no longer be a large issue on site. Disposal cells will have been closed and the only open areas are depicted in Drawings C1.34 and C2.38. It is anticipated that water stored in the tanks at closure will be emptied and sediments removed. Surface water after that point in time will be collected in portable tank trucks and removed from the site for disposal.

4.6 Groundwater

Groundwater will be monitored during operations and closure according to the monitoring plan in Appendix 2.10.1-2 of the LA. Groundwater is not expected to ever be contaminated at the site.

5.0 DOSE MODELING

Unrestricted use, as defined in 30 TAC 336.603, of the facility will be available when the residual radioactivity, distinguishable from background, results in a calculated dose from all pathways to the average member of the critical group that is not in excess of 0.25 mSv/y (25 mrem/y). This is the goal of the LLRW disposal facility even though it will be under the control of a custodial agency for the foreseeable future.

5.1 Unrestricted Release Using Screening Criteria

The concentration of residual radioactivity distinguishable from background that, if distributed uniformly throughout a survey unit, would result in a total effective dose equivalent of 25 millirems per year to an average member of the critical group is called the derived concentration guideline (DCGL).

NUREG-1549, *Decision Methods for Dose Assessment to Comply with Radiological Criteria for License Termination*, describes acceptable methods to calculate DCGL values, methods to calculate site-specific DCGL values for buildings and soil, methods to calculate area factors for use with the elevated measurement comparison, and methods for handling special circumstances in buildings and soil.

WCS will obtain TCEQ approval of its DCGL and area factors prior to remediating the site and conduct the final status surveys because the remediation design and the final status survey design will depend on the DCGL and area factors.

5.1.1 *Unrestricted Release Using Screening Criteria for Building Surface Residual Radioactivity*

The “DandD” code developed by the NRC is presently available and may be used to perform generic screening. RESRAD-Build and other acceptable codes may be used for the entire site or for specific portions or components of the site. Codes will be selected and used only for the portions of the facility/site/component where the code is appropriate. The minimum justification for the use of the default scenarios and parameters will be provided by a statement from the licensee that no conditions are reasonably expected to exist at the site, outside those incorporated in the default scenarios and modeling assumptions that would cause a significant increase in the calculated dose.

In generic screening, the licensee need only provide site-specific final status survey results that are compared with the generic DCGL. If compliance can be demonstrated by using NRC's screening models and parameter values, progression to more site-specific analysis is unnecessary.

5.1.2 *Unrestricted Release Using Screening Criteria for Surface Soil Residual Radioactivity*

Screening criteria for surface soil residual radioactivity will be developed the same as for buildings and structures above.

6.0 ENVIRONMENTAL INFORMATION

Environmental information regarding the Site is found in Sections 2 and 11 of the LA. These sections discuss the purpose and need for the proposed project, alternative to the project and characteristics of the proposed site. Short-term and long-term effects of the proposed facility are provided in Section 11.6. Section 11.7 evaluates the environments effects of accidents at the site. Appendix 11.1.1 of the LA provides the Site environmental report.

7.0 ALARA ANALYSIS

An ALARA review of the facility was conducted as part of the LA and included as Appendix 5.5.2-2. The Facility Radiation Safety Program and procedures described in Appendix 5.5.2-1 of the LA will remain in effect throughout the closure period and will govern activities associated with the facility decontamination. The ALARA policy described in procedures LL-RS-20, "ALARA Program," and LL-RS-21, "ALARA Exposure Data Review," will apply to all decontamination activities. For example, as stated in section 4.1.8 of RS-20, where practical, WCS shall employ engineering controls (i.e., containment, shielding, ventilation, remote handling, etc.) to maintain radiation exposure ALARA.

Dose-based requirements for final license termination are found in 30 TAC 336 Subchapter G. These regulations establish license termination for unrestricted and restricted use. In addition to the Texas specific limits, all doses will be maintained ALARA doses as defined in 30 TAC 336.2(10).

8.0 PLANNED DECOMMISSIONING ACTIVITIES

For the most part, contamination found in site areas and buildings will be remediated during operations as it is located. This will minimize the overall decontamination that must be performed during closure. While operational surveys of suspected and verified contamination will be available during closure, an updated survey will be prepared. All postings and exclusion barriers will be verified and updated to support closure activities. Smear surveys to verify areas of known contamination are non-removable and will be accomplished during this process, and fixtures or updated markings will be documented using existing WCS radiation protection procedures listed above. Some secondary waste associated with radiation survey activities is expected.

8.1 Contaminated Structures

Surveys and the design of surveys will be based on MARSSIM guidance documents. Buildings and structures on site that were used to support waste disposal activities will be surveyed and assessed for required decommissioning activities prior to removal from the site. Buildings and structures might be razed and disposed or they could be removed intact from the site for reuse by others. It is unlikely that buildings and structures used outside of the radiation-controlled areas will contain any contamination, but this will be verified through the surveys performed. Site and building maps will be developed with background sampling and survey locations with grid spacing based on site radiological conditions and MARSSIM protocols. All contamination and

spills during operations will be recorded and documented so they can be closed out upon decommissioning the site.

8.2 Contaminated Systems and Equipment

Equipment used on site in association with radioactive contamination will be surveyed and released per guidance from 30 TAC 336.364 Appendix G, "Acceptable Surface Contamination Levels." This document specifies total average, total maximum, and total removable surface contamination limits for alpha and beta/gamma contamination for four categories of radionuclides.

Contamination surveys will be conducted by on-site personnel trained in the use of equipment and survey techniques. The following procedures found in Appendix 5.5.2-1 provide guidance and direction on performing surveys of contaminated buildings, structures, and equipment:

- LL-RS-3 Contamination Survey Techniques
- LL-RS-4 Documentation of Radiological Surveys
- LL-RS-7 Personnel Contamination Monitoring
- LL-RS-9 Release of Items from Controlled Areas
- LL-RS-10 Radioactive Material Receipt, Staging, and Release Surveys
- LL-RS-11 Operation of Portable Survey Instruments
- LL-RS-12 Operation and Calibration of Scalar Instruments
- LL-RS-18 Equipment Decontamination

Equipment that is released from the site will be suitable for unrestricted use. This includes operating machinery, hand tools, etc. Equipment that cannot be released for unrestricted use will be dismantled and disposed as radioactive waste within the disposal site during closure. Final closure will be sequenced so that all secondary waste from decommissioning activities can be placed in a disposal cell before final closure. Final cover installation is essentially a clean operation. Any equipment or other items contaminated during final cover installation will be decontaminated or disposed of at another disposal facility.

8.3 Soil

The facility will be graded to achieve sheet flow to natural drainage. Sheet flow is preferable to concentrated flow because sediment transport and erosion is reduced. Berms will be removed and the new surface will be graded to final design grades and contours. The final contours will be optimized based on operational history of the erosion process at the site. The final grading plan is shown in Drawing C0.11.

Consideration has been given to the initial design for long term erosion. Appendix 6.4-3 to Appendix 2.6.1 discusses the potential erosion effects of the site. It has been determined that erosion is not an active process on the site. It was discovered from aerial photographs that there was one area of localized erosion on or before 1938, but that area was later covered with windblown sand and was completely buried after time (see section 2.5.7.1 of Section 2.0, "Site Characteristics," and other documents referenced therein). Overall, the site has been either stable or aggrading (deposition of sediment), and therefore erosion is not an item of concern.

After completion of grading, all disturbed areas of the site that have not been previously re-vegetated or stabilized will be planted with selected native and adapted plant species or will be armored using riprap. By placing vegetation, the site will be more resistant to erosion by wind and water and, therefore, more stable. Because the amount of erosion that happens on site will be reduced by placing vegetation, the amount of active maintenance on the final cover will be reduced.

8.4 Surface and Groundwater

Surface and groundwater at the site will have approximately 35 years of continuous monitoring and sampling to ensure that contamination does not exist. Should contamination be found in surface or groundwater it will be immediately mitigated to prevent further spread of contamination. It is expected that at the time of closure there will be enough information about groundwater and potential contamination that will preclude the necessity of remediation.

8.5 Schedules

An activity-based schedule for site closure activities is provided in Appendix 14.4-1 of the LA. Closure is scheduled to begin 35 years after the start of operations and proceed for one year. This schedule is identical to the schedule included in Appendix 6.1.1-1, and does not include post closure and institutional control periods. The overall master timeline for disposal facility development is provided as Appendix 14.1-2. More detailed and updated schedules will be developed as the time of closure approaches and detailed information is available to apply to schedules. Final dates in the schedule are contingent upon TCEQ approval of the final Decommissioning Plan. If the decommissioning is not expected to be completed within the timeframes outline in the TCEQ regulations, a request for alternative schedule for completing the decommissioning will be made.

9.0 PROJECT MANAGEMENT AND ORGANIZATION

9.1 Decommissioning Management Organization

The same management organization used in the facility operations will be employed during closure and post-closure. It is anticipated that with a reduced work load during closure the workforce will also be reduced to match the workload. Adjustments to the organization will be made in subsequent amendments to this plan. The proposed management organization for development, operations and closure of the WCS LLRW disposal facility is detailed in Section 10 of the LA.

9.2 Decommissioning Task Management

Decommissioning tasks will be managed with the use of Radiation Work Permits (RWP). Procedure LL-RS-1, "Radiation Work Permits," provides a description of how individual decommissioning

9.3 Decommissioning Management Positions and Qualifications

The management positions currently identified as important to the conduct of planned decommissioning activities are listed below. The responsibilities and qualifications for each position are the same as listed in Appendix 10.5 and are not repeated here.

- Vice President and General Manager
- Director of Operations
- Director of Environmental, Safety and Health
- Radioactive Waste Manager
- Director of Quality Assurance
- Facility Quality Assurance Manager
- Radiation Technician
- Radiation Safety Officer
- Radiation Safety Supervisor

9.4 Training

Personnel performing decontamination activities and radiological surveys will be trained and qualified in accordance with Section 10 of this application. It is anticipated the same personnel that conducted facility operations or new personnel with similar qualifications will be used during closure. Senior and Junior Radiation Technicians on site will comply with the required training and qualification outlined in Appendix 10.4, "WCS Training Plan" (procedure TRN-1.1). Additional training for personnel will be performed in accordance with the procedures found in Section 5 of the LA.

9.5 Contractor Support

WCS does not intend to use contractor support in the decommissioning of the facility. Workers and personnel that were employed to operate the facility will be used in the closure of the facility. Should the need arise for contractor support, WCS will submit the following information regarding the use of contractors:

- A summary of decommissioning tasks that will be performed by contractors
- A description of the management interfaces that will be in place between the management and on-site supervisors, and the contractor management
- A description of the oversight responsibilities and authority that the licensee will exercise over contractor personnel
- A description of the training that will be provided to contractor personnel by the licensee and the training that will be provided by the contractor
- A commitment that the contractor will comply with all radiation safety and license requirement at the facility

10.0 HEALTH AND SAFETY PROGRAM DURING DECOMMISSIONING: RADIATION SAFETY CONTROLS AND MONITORING FOR WORKERS

10.1 Air Sampling Program

The following procedures, from Section 5.5 of the LA, make up the air sampling program that will be employed during the decommissioning process. This includes a description of the criteria, conditions that require monitoring, calibration of flow meters, and action levels for air sampling results:

- LL-EV-7.1.2 Air Sampling
- LL-OP-1.3 Reporting and Notification Requirements
- LL-RSP-100 Radiation Safety Program
- LL-RS-6 Control of Airborne Radiation Areas
- LL-RS-7 Personnel Contamination Monitoring
- LL-RS-14 Airborne Radioactive Material Survey Methods
- LL-RS-28 Operation and Use of Continuous Air Monitoring (CAM) Equipment
- LL-RS-29 Operation and Use of High Efficiency Particulate Air (HEPA) Filter Equipment

10.2 Respiratory Protection Program

The respiratory protection program is described in procedure LL-HS-10.0, "Respiratory Protection Program." This program describes when respiratory protection equipment is appropriate, medical screening and fit testing requirements, and written procedures to address all the elements of the respiratory protection program. Also included in the procedures is a description of use, maintenance, and storage of protection devices, training program requirements, and considerations made when selecting respiratory protection equipment.

Additional procedures related to the respiratory protection program include but are not limited to:

- LL-HS-4.0 Personal Protective Equipment
- LL-HS-16.0 Job Safety Analysis Program
- LL-RS-2 Contamination Area Controls
- LL-RS-6 Control of Airborne Radiation Areas

10.3 Internal Exposure Determination

The WCS internal exposure determination is provided by procedure LL-RS-17, "Internal Radiation Monitoring and Bioassay Sampling." This procedure is implemented to support the requirements of 30 TAC §336.308, *Determination of Internal Exposure*. Implementing this procedure helps to establish ALARA controls designed to comply with 30 TAC §336.304, *Radiation Protection Programs*. The regulation requirements are described fully in LL-RS-20,

"ALARA Program," which is then implemented through procedure LL-RS-21, "ALARA Exposure Data Review."

10.4 External Exposure Determination

The WCS external exposure determination is provided by procedure LL-RS-15, "External Monitoring Program and Dosimeter." This procedure satisfies applicable requirements of 30 TAC §336.316, *Conditions Requiring Individual Monitoring of External and Internal Occupational Dose*.

10.5 Summation of Internal and External Exposures

Results from internal and external monitoring performed as described above will be used to calculate total organ dose equivalent (TODE) and total effective dose equivalent (TEDE) doses to occupational workers in accordance with 30 TAC §336.306, *Compliance with Requirements for Summation of External and Internal Doses*.

External and internal dose is reported together on 30 TAC §336.368, Appendix K, "Occupational Exposure Record for a Monitoring Period" (or equivalent form), and 30 TAC §336.367, Appendix J, "Cumulative Occupational Exposure History" (or equivalent form).

Exposure reports will be maintained according to 30 TAC §336.355, *Reports of Individual Monitoring* and 30 TAC §336.354, *Reports to Individuals*.

Exposure reports are considered to be "Records of Surveys" and will comply with procedure LL-RS-4, "Documentation of Radiological Surveys." Additionally, the following regulations must be satisfied relating to exposure report recordkeeping:

- 30 TAC §336.344, *Records of Prior Occupational Dose*
- 30 TAC §336.346, *Records of Individual Monitoring Results*

10.6 Contamination Control Program

The contamination control program for decommissioning during closure consists of written procedures to control access to, and stay time in contaminated areas by workers. Additional procedures will supplement personnel monitoring for workers during routine operations, maintenance, clean-up activities, and special operations. Procedures that make up the contamination control program include, but are not limited to:

- LL-RSP-100 Radiation Safety Program
- LL-RS-1 Radiation Work Permits
- LL-RS-2 Contamination Area Controls
- LL-RS-3 Contamination Survey Techniques
- LL-RS-5 Radiological Area Posting
- LL-RS-6 Control of Airborne Radiation Areas
- LL-RS-9 Release of Items from Controlled Areas
- LL-RS-20 ALARA Program

10.7 Instrumentation Program

Instrumentation used to support the health and safety program will include field survey and laboratory instruments and will be determined based upon the radiation contamination expected, the instrument efficiency, effectiveness, and sensitivity. The following procedures provide details of how instrumentation will be maintained, calibrated, stored, and used in the field:

- LL-QA-12.0 Control of Measuring and Testing Equipment
- LL-RS-3 Contamination Survey Techniques
- LL-RS-11 Operation of Portable Survey Instruments
- LL-RS-12 Operation and Calibration of Scalar Instruments
- LL-RS-13 Radiation Dose Rate Survey Techniques
- LL-RS-14 Airborne Radioactive Material Survey Methods
- LL-RS-25 Operation and Calibration of the Canberra Tennelec Series 5 Counter
- LL-RS-26 Operation and Calibration of Air Monitoring Equipment
- LL-RS-27 Handling and Use of Calibration and Check Sources
- LL-RS-28 Operation and Use of Continuous Air Monitoring (CAM) Equipment

Methods used to estimate the MDC or MDA for each type of radiation to be detected will be established at the time of decommissioning.

10.8 Nuclear Criticality Safety

Nuclear criticality is not an issue of concern at the LLRW waste facilities. The WCS LLRW Disposal Facility is classified as a non-nuclear radiological facility. Waste inventories and acceptance criteria prevent criticality from becoming an issue at the site. To ensure this, the site RSO is responsible for implementing procedure LL-OP-1.4, "Special Nuclear Material."

10.9 Health Physics Audits, Inspections, and Recordkeeping Program

Periodic health physics audits shall be performed in accordance with the Quality Assurance Program found in Appendix 9.0 and specifically procedure LL-QA-18.1, "Audits." The Radiation Protection Program will be audited focusing on compliance with the Radiation Safety Program and pertinent regulations. Audits will be directed by the WCS QA department with the concurrence of the Radiation Safety Committee. Audit schedules for individual activities will be identified with consideration given to the ALARA, regulatory, and safety impact. Topics may be drawn from the table of contents of LL-RSP-100 and subordinate implementing procedures.

The Industrial Health and Safety Program will be audited focusing on compliance with the Health and Safety Plan, LL-HS-100, and the Respiratory Protection Program. Audits will be conducted by the WCS QA department with the concurrence of the Environmental, Safety and Health Director.

Inspections will be performed in accordance with WCS procedure LL-QA-10.0, "Inspections." Records demonstrating performance of these procedures shall be created and retained in accordance with all applicable statutory and regulatory requirements, WCS procedure LL-QA-

17.1, "Quality Assurance Records," and supplemental WCS records management policies and procedures.

11.0 ENVIRONMENTAL MONITORING AND CONTROL PROGRAM

11.1 Environmental ALARA Evaluation Program

A description of the engineering controls and process controls to maintain doses ALARA are described in WCS procedure LL-RS-20, "ALARA." A description of the ALARA reviews and report to management are provided in WCS procedure LL-RS-21, "ALARA Exposure Data Review."

11.2 Effluent Monitoring Program

A demonstration that background and baseline concentrations of radionuclides in environmental media have been established through appropriate sampling and analysis and are provided in Section 2.10.2 of the LA. The monitoring plans in Appendices 2.10.1-2 and 2.10.2-2 will provide data over the operational life and during closure of the facility to describe the physical, chemical and radionuclide characteristics placed in the CWF and FWF disposal areas. The environmental monitoring regime will determine the performance of the disposal units and provide detailed data to support closure of the facility.

11.3 Effluent Control Program

Several features of the LLRW have been designed to minimize releases of radioactive material to the environment. These include surface features designed into the system, liner system design, canister design, cover system design, leachate monitoring, and other features that are described in detail in Section 3, "Design" of the LA.

Procedures have been developed to ensure that releases of radionuclides will not occur to the environment. Procedures include but are not limited to:

- LL-EV-7.1.16 Environmental Data Reporting
- LL-OP-2.8 Managing On-Site Generated Waste
- LL-OP-6.1 Placement of Contact Handled Waste In Canisters
- LL-OP-7.1 Non-Canister Soil Placement
- LL-OP-7.2 Non-Canister Debris/Rubble Placement
- LL-OP-7.2 Non-Canister Compaction Testing
- LL-OP-9.5 Decontamination Water Management
- LL-OP-9.6 Handling Damaged Container and Overpacking
- LL-OP-9.7 Spill Response

Section 8 of the LA outlines the risk assessment for the entire site associated with the LLRW facility. Estimates of doses to the public from the buried waste are presented.

12.0 RADIOACTIVE WASTE MANAGEMENT PROGRAM

12.1 Solid Radioactive Waste

Solid radioactive waste that will be generated for disposal during decommissioning of the facility includes waste from existing buildings, roads, tanks, structures, and appurtenances used on site. For estimating volumes and subsequent costs associated with the volumes, it is conservatively assumed that all waste generated from razing and disposing the site facilities will be placed into either the FWF or CWF on site. Table 6.1.1-1-2, Table 6.1.1-1-3, and Table 6.1.1-1-4 provide the estimated quantity of waste to be disposed of in the CWF, FWF-CDU, and FWF-NCDU facilities. Contaminated waste will either be disposed of as bulk soil and rubble or placed in canisters, depending on the nature and final characterization of the waste.

The quantities developed in Table 6.1.1-1-2, Table 6.1.1-1-3, and Table 6.1.1-1-4 were conservatively estimated from experienced demolition contractors and are based upon the overall total building sizes from the initial design of the facilities. Calculations have been performed to convert the overall tonnage estimated into cubic feet volumes in order to estimate the number of canisters and bulk waste that will be generated. Calculation packages for development of associated costs are provided in Confidential Annex 2 of the LA.

12.2 Liquid Radioactive Waste

Liquid radioactive waste, by definition, is not allowed at this facility and therefore is not expected to be generated at this facility. Should the need arise to deal with liquid radioactive waste, it will require solidification and must meet the current waste criteria developed and discussed in Section 5.2.6 of the LA.

12.3 Mixed Waste

It is not expected that any chemical hazardous waste will be generated during closure. The only chemically hazardous waste on site is that received during the operational phase of the facility. No chemicals are anticipated for use on site. However, should the need arise, the waste will be classified in accordance to the RCRA waste facility requirements, satisfy the Land Disposal Restrictions (LDR), and be disposed of in the RCRA facility in accordance with applicable regulations and WCS permits.

13.0 QUALITY ASSURANCE PROGRAM

13.1 Organization

The authority to administer the WCS QA Program described in the WCS QA Plan provided in Appendix 9.0 of the LA and implementing procedures is assigned to the WCS Quality Assurance Director.

All WCS Managers and employees are responsible for implementing the procedures required by this program. WCS personnel are given authority commensurate with their responsibility, including the authority to stop work that does not conform to established requirements. Stop-

work authority, including investigation, resolution, completion of corrective actions and authorization for restarting work, is to be exercised in accordance with procedures.

Key personnel implementing the quality assurance program are listed in Section 9.3 of this plan. Responsibility and qualifications are as described in Appendix 10.5 of the LA.

13.2 Quality Assurance Program

WCS has developed a comprehensive quality assurance program that establishes the quality assurance requirements and applicable management controls to control quality-affecting items and work activities for WCS waste facilities. The resulting WCS Quality Assurance (QA) Program applies as written to WCS quality affecting activities (i.e., deeds, actions, processes, tasks or work, which influence the achievement or verification of quality requirements and objectives for Quality Level 1 and 2 Structures, Systems, Components (SSC) and related work activities. This program consists of this policy statement, Quality Assurance Plan (QAP) and the WCS implementing procedures.

The WCS QA Plan and its implementing procedures defines the actions to be taken by WCS management and employees during the performance of quality affecting activities to ensure QA requirements are consistently met. This QA program is based on line and staff organizations being responsible and held accountable for the quality of their assigned work. The QA organization is charged with verifying the achievement of quality through audits, surveillances, assessments and reviews.

13.3 Document Control

Document control is defined and implemented with procedure LL-QA-6.1. This procedure describes the WCS system for ensuring that correct versions of documents meeting the definition of controlled document are distributed to appropriate personnel, in either hard copy or electronic form, and are available for use.

13.4 Control of Measuring and Test Equipment

Control of measuring and test equipment is implemented in procedure LL-QA-12.0. The purpose of this procedure is to define the methods and responsibilities for ensuring those tools, gages, instruments, and other measuring and test equipment used for quality-affecting activities are controlled and at specified periods calibrated and adjusted to maintain accuracy within necessary limits. Calibration and control shall not be required for rulers, tape measures, levels, and other normal commercial equipment that provides adequate accuracy.

13.5 Corrective Action

Corrective action is to ensure that deficiencies are identified promptly and corrected as soon as practical in a manner that precludes recurrence and is describe in procedure LL-QA-16.1.

This procedure specifies requirements to ensure that:

- Prompt remedial actions are taken to correct each reported deficiency whenever possible
- The cause of the condition that allowed each reported deficiency to occur is determined
- Interim and preventative actions are taken to preclude recurrence of the condition that allowed the deficiency to occur
- Corrective actions are determined, performed, documented, and reported to appropriate management by authorized personnel

13.6 Quality Assurance Records

Quality assurance records will be developed and managed according to procedure LL-QA-17.1.

13.7 Audits and Surveillances

Audits and surveillances in association with quality assurance will be managed by the following procedures found in Section 5 of the LA:

- LL-QA-18.1 Audits
- LL-QA-10.0 Inspections

Trending/tracking will be performed on the results of audits and surveillances in accordance with procedure LL-QA-2.3, "Trending of Quality Assurance and Quality Control Data."

14.0 FACILITY RADIATION SURVEYS

This section describes the survey methods that will be used to enable decontamination of all structures and equipment remaining on site or released off site after the operating stage of the license has been terminated.

14.1 Release Criteria

The *Multi-Agency Radiation Surveys and Site Investigation Manual (MARSSIM)* provides detailed guidance for planning, implementing, and evaluating environmental and facility radiological surveys conducted to demonstrate compliance with a dose- or risk-based regulation. MARSSIM will be implemented in the final decontamination and closure of the facility. This survey method focuses on the demonstration of compliance during the final status survey following scoping, characterization, and any necessary remedial actions. It will be used to release buildings, structures, and adjoining land areas where radioactive materials were present.

Release criteria will be developed at the time of closure and include:

- A summary table or list of the DCGL_W for each radionuclide and impacted media of concern
- If Class 1 survey units are present, a summary table or list of area factors that will be used for determining a DCGL_{EMC} for each radionuclide and media of concern

- If Class 1 survey units are present, the $DCGL_{EMC}$ values for each radionuclide and medium of concern
- If multiple radionuclides are present, the appropriate $DCGL_W$ for the survey method to be used

14.2 Characterization Surveys

Prior to commencing demolition/decommissioning activities, the decontamination process and verification surveys must be complete and all furnishings, equipment, and fixtures with salvage value will be removed. The primary objective of characterization surveys are to:

- Determine the nature and extent of the contamination
- Collect data to support evaluation of remedial alternatives and technologies
- Evaluate whether the survey plan can be optimized for use in the final status survey
- Provide input to the final status survey design

Characterization surveys will be prepared with the use of a reference grid, systematic and judgment measurements, and survey of different media (e.g., surface soils, interior and exterior surfaces of buildings). Decisions as to which media will be surveyed will be a site-specific decision addressed throughout the radiation survey and site investigation process.

Included with characterization surveys to be performed will be:

- A description and justification of the survey measurements for impacted media
- A description of the field instruments and methods that will be used for measuring concentration and the sensitivities of those instruments and methods
- A description of the laboratory instrument and methods that will be used for measuring concentrations and the sensitivities of the instruments and methods
- Survey results, including tables or charts of the concentrations of residual radioactivity measured
- Maps or drawings of the site, area, or building, showing areas classified as non-impacted or impacted
- Justification for considering areas to be non-impacted

14.3 In-Process Surveys

Areas of the facility that have been adequately characterized and found to be contaminated above the derived concentration guideline levels (DCGLs) will become part of the remedial action and decommissioning. Remedial action support surveys will be performed while remediation is being conducted, and will guide the cleanup in a real-time mode. Remedial action support survey will be conducted to:

- Support remediation activities
- Determine when a site or survey unit is ready for the final status survey
- Provide updated estimates of site-specific parameters used for planning the final status surveys

Field screening will include a description of methods and instrumentation, and a demonstration that field screening is capable of detecting residual radioactivity at the DCGL.

14.4 Final Status Survey Design

Final status surveys will be used to demonstrate compliance with regulations. This survey will be the major focus of the remedial action. The primary objective of final status survey is to:

- Select/verify survey unit classification
- Demonstrate that the potential dose or risk from residual contamination is below the release criterion for each survey unit
- Demonstrate that the potential dose or risk from small areas of elevated activity is below the release criterion for each survey unit

The final status surveys will provide data to demonstrate that all radiological parameters satisfy the established guideline values and conditions.

Included in the final status survey design will be:

- An overview describing the FSS design
- A description and map or drawing of impacted areas of the site, area, or building classified by residual radioactivity levels (Class 1,2, or 3) and divided into survey units with an explanation of the basis for division into survey units
- A description of the background reference areas and material, if they will be used, and a justification for their selection
- A summary of the statistical test that will be used to evaluate the survey results
- A description of the background reference areas and materials, if they will be used, and a justification for their selection
- A summary of the statistical tests that will be used to evaluate the survey results
- A description of scanning instrument, methods, calibration, operational checks, coverage, and sensitivity for each media and radionuclide
- For in-situ sample measurements made by field instruments, a description of the instruments, calibration, operational checks, sensitivity, and sampling methods, with a demonstration that the instruments and methods have adequate sensitivity
- A description of the analytical instruments for measuring samples in the laboratory, as well as calibration, sensitivity, and methods with a demonstration that the instrument and methods have adequate sensitivity
- A description of how samples will be analyzed in the laboratory as well as collected, controlled, and handled
- A description of final status survey investigation levels and how they were determined
- A summary of direct measurement results and soil concentration levels in used that are comparable to the DCGL, and if data is used to estimate or update the survey unit
- A summary of the direct measurement or sample data used to both evaluate the success of remediation and to estimate the survey unit variance

14.5 Final Status Survey Report

All surveys generated during the decommissioning of the facility will be maintained and provided in a final status survey report that provides backup and verification that the facility meets criteria for unrestricted radiological release. All portions of the site will be decontaminated to meet unrestricted radiological release criteria, including those portions of the site overlying disposed waste. The portions of the site overlying disposed waste will be identified for restricted use and transfer to a custodial agency. In addition, at the time of complete closure, all information on reports, studies, site maintenance records, engineering designs and specifications, as-built drawings, operational surveys, vehicle release surveys, monitoring equipment calibration records, quality assurance documentation, and any other information necessary to assess the adequacy of decontamination and decommissioning operations will be provided to TCEQ and other regulators. Records will be submitted in a manner that makes them accessible, readable, and reproducible.

15.0 FINANCIAL ASSURANCE

15.1 Cost Estimate

A cost estimate based on reasonable assumptions for decommissioning of the facility has been prepared. The closure cost estimate is provided in Appendix 6.1.5-1, "WCS Closure Cost Estimate," and an unplanned closure cost estimate is provided in Appendix 6.1.5-2, "WCS Unplanned Closure Estimate." Details on the development and implementation of the closure cost estimates are provided in Section 6 of the LA.

15.2 Certification Statement

WCS has provided a certification statement that funds will be available for closure and decommissioning of the facility. Section 12, "Financial Qualification and Financial Assurance," provides a description of the financial certification. Appendix 12.1.4-1 provides closure/post-closure financial assurance cover letter.

15.3 Financial Mechanism

The financial mechanisms to be used in the closure and decommissioning of the facility are found in Section 12, "Financial Qualification and Financial Assurance" of the LA.

16.0 RESTRICTED USE/ALTERNATE CRITERIA

16.1 Restricted Use

The CWF, FWF-CDU, and FWF-NCDU will be incrementally covered as operations proceed, so final cover system placement will be limited to closure of the final disposal cell used in the decontamination process and construction verification of completed work and correction or modification of any components or features, if required. These areas of the facility will be enclosed with the buffer zone and security fence which will make them restricted areas.

Final survey markers and durable location monuments will be placed as indicated in the facility drawings. The survey markers and monuments serve two purposes. They will be used during post-closure activities to verify settlement that could occur after final closure. They will also serve to provide information to inadvertent intruders as to the nature and disposition of waste

buried on site. Locations and additional information about these markers can be found on Drawing C0.07.

Final surveys on site will be performed to ensure drainage away from the disposal units, ensure final grading conforms to required specifications, and provide initial elevations to which annual settlement surveys can be compared.

16.1.1 Eligibility Demonstration

Section 8, "Performance Assessment," of the LA demonstrates compliance with dose limits for workers and members of the public to assure that the proposed residual radioactivity levels at the site are ALARA.

16.1.2 Institutional Controls

Detailed institutional controls have been developed for the proposed site and are found in Section 7 of the LA. The Post-Closure and Institutional Control Plan outlines the activities that will occur during these phases of the LLRW disposal unit design and operations. Activities conducted during construction, operations, and closure of the facility are designed to ensure that post-closure activities will be kept at a minimum and the ongoing need for active maintenance will not be required.

16.1.3 Site Maintenance and Financial Assurance

The following sections discuss active and passive maintenance that will be performed starting in the closure period and continuing on into the post-closure period.

16.1.3.1 Surface Control Inspection

Surface features and grading will be inspected visually on a monthly schedule. Cover vegetation and effectiveness in managing erosion will be the primary focus of this inspection, but access fencing and drain path stability will also be evaluated. This process is expected to continue during post-closure and institutional control, but the frequency may be reduced with time as the site matures. The inspection process is presented in the Closure and Post-Closure Monitoring Plan (Appendix 6.1.2.1-1.)

16.1.3.2 Leachate Monitoring/Management

Leachate detection and collection will continue until at least 30 years for the FWF and 5 years for the CWF or until piping is unproductive, whichever is longer. At this point, riser piping will be closed similar to deep well drinking water standards to preclude instruction. Flags will be placed at each riser pipe to indicate their location. Leachate management operations are described in Section 3.4 and 3.5 and operating procedures for leachate management are provided in Appendix 3.0-1.

16.1.3.3 Stability/Subsidence Monitoring

A verification survey of the site marker and cover system elevation will be performed annually to evaluate settlement with time. In addition to permanent markers and benchmarks, cover grade profiles will be determined and compared to existing records. Both general settlement and

differential settlement will be evaluated on a regular basis, and is assumed to continue during the institutional period. The verification and evaluation process is presented in the Closure and Post-Closure Monitoring Plan (Appendix 6.1.2.1-1.)

16.1.3.4 Fence Line Marker Inspection

Access control fences, gates, and monuments will be inspected to ensure proper function. This may be accomplished as part of passive maintenance activities. The inspection process is presented in the Closure and Post-Closure Monitoring Plan (Appendix 6.1.2.1.)

16.1.3.5 Post-Closure Environmental Monitoring

Closure and post-closure monitoring will be conducted as identified in the WCS license, or as stipulated by TCEQ. These plans are presented in Appendix 6.1.2-1 and Section 7.2.1, respectively. They include monitoring of items such as erosion in the final cover, slumping and sink holes in the final cover, settlement, and other items. Also, environmental monitoring will continue through site closure, post-closure, and institutional control periods. The environmental monitoring plans are presented in Appendix 2.10.1-2, "Radiological Environmental Monitoring Plan," and Appendix 2.10.2-2, "Non-Radiological Environmental Monitoring Plan." The items to be monitored in these two plans include but are not limited to groundwater, air, soil, vegetation, and fauna.

16.1.4 *Obtaining Public Advice*

Before the end of site operations and before decommissioning activities begin, individuals and institutions in nearby communities that may be affected by decommissioning activities will be contacted and asked for input. Custodial agencies will also be contacted for their recommendations for the areas of the Site, while meeting unrestricted radiological release criteria, where waste was disposed. These areas will be released for restricted use and transferred to the custodial agencies. The input will be evaluated and incorporated into the decision-making related to the decommissioning plan by updating the plan as discussed in this appendix. Actual closure will require a license amendment that will provide opportunities for public hearings.

16.1.5 *Dose Modeling and ALARA Demonstration*

A summary of the dose to the average member of the critical group when radionuclide levels are at the DCGL with institutional controls in place, as well as the estimated doses if they are no longer in place will be performed prior to closure. The performance assessment performed in Section 8 of the LA demonstrates that doses from the closed facility are well below established criteria and are ALARA.

16.2 Alternate Criteria

The facility is sited, designed, and operated on the basis of a 35-year operating life. Flexibility is included in the facility design to accommodate premature temporary or permanent closure of the facility.

16.2.1 *Premature Temporary Closure*

Facility design, which features waste package disposal in concrete canisters for the FWF-CDU and CWF, accommodates premature temporary closure. Individual canisters are projected to be loaded at an approximate rate of 87 per week for the FWF-CDU and 42 per week for the CWF.

These are based on worst-case estimates at an interval between 8 and 12 years after the start of disposal operations. The number of canisters per week will most likely be less than half of these numbers. As canisters are placed in the disposal units back fill is placed in the space between the canisters. After the canisters are loaded with waste a temporary lid is used to cover the waste until the canister is filled with grout. The facility is therefore maintained in a stable condition as a routine feature of normal operations. In the event notification to temporarily cease operations is received, the FWF-CDU and CWF will already be in a stable mode pending further direction from TCEQ.

Depending upon direction from TCEQ, the canisters containing waste but not grouted may be filled with waste packages and the canisters closed or operations could cease immediately. Upon notification from TCEQ, only those waste shipments received prior to receipt of the notification of closure would be processed and placed in the disposal canisters.

The FWF-NCDU is also maintained in a stable condition as a part of normal operations. Following the WCS proposed practices, methods, and procedures for disposal for stable bulk Class A waste, for which WCS seeks Executive Director approval, (See Appendix 5.4.1-2) this waste is disposed of in lifts to maintaining a stable slope of waste. The disposed waste is routinely covered with surfactant to minimize dust and the contact of water with the disposed waste.

During the period of temporary closure, all environmental monitoring activities and routine support activities such as buildings and grounds maintenance would continue as scheduled.

16.2.2 Premature Permanent Closure (“Unplanned Closure”)

In the event the TCEQ orders the facility to close prior to reaching the end of the operating life, the activities described above for closure would be implemented.

The facility design, employing discrete canisters to house the disposed wastes, allows closure at any stage of the operational life similar to planned closure at the end of the design operational life.

Premature permanent closure will consist of:

- Open excavation will be filled with previously removed native fill material
- Engineered earthen cover completion in accordance with construction drawings and specifications
- Required monitoring of all items constructed to date
- Decontamination and decommissioning of the facility will proceed on the estimated closure schedule and will follow the decommissioning activities described in this appendix

These actions apply to each of the disposal units, the CWF, the FWF-CDU, and the FWF-NCDU. Drawings showing the point in facility operations are shown in the following drawings in Appendix 3.0-2:

- CWF – C1.34 through C1.41
- FWF – C2.45 through C2.55 (includes both the CDU and the NCDU)

Cost estimates have been prepared for premature permanent closure and are found in Appendix 6.1.5-2 of the LA.

17.0 DECOMMISSIONING PLAN UPDATE

Periodically throughout the life of the WCS LLRW Disposal Facility life, this decommissioning plan will be updated. At a minimum, it will be updated and included in each amendment to extend the disposal license. It will be updated a final time prior to the start of the closure period.