

**MALLINCKRODT C-T  
DECOMMISSIONING PROJECT**

**Official Project Documents**

**DRAFT  
C-T Phase II Decommissioning Plan  
SRP Checklist**

**May 15, 2003**

**NRC Docket : 40-06563  
NRC License: STB-401**

**Controlled Copy Number 3**

**Issued to: Jean-Claude Dehmel - NRC**

**STANDARD REVIEW PLAN CHECKLIST  
C-T PHASE II DECOMMISSIONING PLAN**

**1. EXECUTIVE SUMMARY**

**a. The name and address of the licensee or owner of the site**

Provided in §1 Executive Summary, paragraph 1.

**b. The location and address of the site**

Provided in §1 Executive Summary, paragraph 3.

**c. A brief description of the site and immediate environs**

Provided in §1 Executive Summary, paragraph 4

**d. A summary of the licensed activities that occurred at the site**

Provided in §1 Executive Summary, paragraphs 5 through 7.

**e. The nature and extent of contamination at the site**

Provided in §1 Executive Summary, paragraphs 8 and 9.

**f. The decommissioning objective proposed by the licensee (i.e., restricted or unrestricted use)**

Provided in §1 Executive Summary, paragraphs 10 through 12

**g. The DCGL for the site, the corresponding doses from these DCGL and the method that was use to determine the DCGL**

Provided in §1 Executive Summary, paragraphs 14 through 16.

**h. A summary of the ALARA evaluations performed to support the decommissioning**

Provided in §1 Executive Summary, paragraph 17 through 19.

**i. If the licensee or responsible party requests license termination under restricted conditions, the restrictions the licensee intends to use to limit doses as required in 10 CFR Part 20.1403 or 20.1404 and a summary of institutional controls, financial assurance.**

Licensee does not request license termination with restriction.

**STANDARD REVIEW PLAN CHECKLIST  
C-T PHASE II DECOMMISSIONING PLAN**

- j. If the licensee requests license termination under restricted conditions or using alternate criteria a summary of the public participation activities undertaken by the licensee to comply with 10 CFR Part 20.1403(d) or 20.1404(a)(4)**

Licensee does not request license termination with restriction nor does it propose alternate radiological criteria.

- k. The proposed initiation and completion dates of decommissioning**

Provided in §1 Executive Summary, paragraph 20.

- l. Any post-remediation activities (such as groundwater monitoring) that the licensee proposes to undertake prior to requesting license termination**

Provided in §1 Executive Summary, paragraph 13.

- m. A statement that the licensee is requesting that its license be amended to incorporate the decommissioning plan**

Provided in §1 Executive Summary, paragraph 2.

# STANDARD REVIEW PLAN CHECKLIST C-T PHASE II DECOMMISSIONING PLAN

## 2.0 FACILITY OPERATING HISTORY

### 2.1. INTRODUCTION

This is descriptive information is not required by the SRP.

### 2.2. LICENSE NUMBER/STATUS/AUTHORIZED ACTIVITIES

- a. **The radionuclides and maximum activities and quantities of radionuclides authorized and used under the current license.**

Section 2.2.1, paragraphs 1, 2.

- b. **The chemical forms of the radionuclides authorized and used under the current license.**

Section 2.2.1, paragraph 2.

- c. **A detailed description of how the radionuclides are currently being used at the site.**

Section 2.2.1, paragraph 3.

- d. **The location(s) of use and storage of the various radionuclides authorized under current licenses.**

Section 2.2.2

- e. **A scale drawing or map of the building or site and environs showing the current locations of radionuclide use at the site.**

Section 2.2.2, Table 2-1, and Figure 2-1.

- f. **A list of amendments to the license since the last license renewal.**

Section 2.2.1, paragraph 2.

### 2.3. LICENSE HISTORY

- a. **The radionuclides and maximum activities of radionuclides authorized and used under all previous licenses.**

Section 2.3

- b. **The chemical forms of the radionuclides authorized and used under all previous licenses.**

Section 2.3

**STANDARD REVIEW PLAN CHECKLIST  
C-T PHASE II DECOMMISSIONING PLAN**

- c. A detailed description of how the radionuclides were used at the site.**

Section 2.3

- d. The location(s) of use and storage of the various radionuclides authorized under all previous licenses as described in 10 CFR 30.35(g), 40.36(f), 70.25(g), 72.30(d).**

Section 2.3

- e. A scale drawing or map of the site, facilities and environs showing previous locations of radionuclide use at the site as described in 10 CFR 30.35(g), 40.36(f), 70.25(g)**

Figures 2-1, 2-3, 2-4, and 2-5

**2.4. PREVIOUS DECOMMISSIONING ACTIVITIES**

- a. A list or summary of areas at the site that were remediated in the past.**

Sections 2.4.1 and 2.4.2

- b. A summary of the types, forms, activities and concentrations of radionuclides that were present in previously remediated areas.**

Section 2.4.1, paragraph 2 and Section 2.4.2

- c. The activities that caused the areas to be contaminated.**

Section 2.3, Section 2.4.1 paragraph 2, and Section 2.4.2

- d. The procedures used to remediate the areas and the disposition of radioactive material generated during the remediation.**

Section 2.4.1, paragraph 2 and Section 2.4.2

- e. A summary of the results of the final radiological evaluation of the previously remediated area including the locations and average radionuclide concentrations in the previously remediated area.**

Section 2.4.1, paragraph 2 and Section 2.4.2, paragraph 8

- f. A scale drawing or map of the site, facilities and environs showing the locations of previously remedial activity.**

Section 2.4.1, paragraph 2 and Section 2.4.2, paragraph 8

**2.5 SPILLS**

- a. A summary of areas at the site where spills (or uncontrolled releases) of radioactive material occurred in the past.**

Section 2.5

**STANDARD REVIEW PLAN CHECKLIST  
C-T PHASE II DECOMMISSIONING PLAN**

- b. The types, forms, activities and concentrations of radionuclides involved in the spill or uncontrolled release.**

Section 2.5, paragraph 5.

- c. A scale drawing or map of the site, facilities, and environs, showing the locations of spills.**

Section 2.5, paragraph 5.

**2.6 PRIOR ON-SITE BURIALS**

- a. A summary of areas at the site where radioactive material has been buried in the past.**

Section 2.6, paragraphs 1 and 2.

- b. The types, forms, activities and concentrations of waste and radionuclides in the former burial(s).**

Section 2.6, paragraph 1

- c. A scale drawing or map of the site, facilities and environs showing the locations of former burials.**

Figure 2-5

**STANDARD REVIEW PLAN CHECKLIST  
C-T PHASE II DECOMMISSIONING PLAN**

**3. FACILITY DESCRIPTION**

**3.1 SITE LOCATION AND DESCRIPTION**

- a. The size of the site in acres or square meters.**  
Section 3.1, paragraph 1.
- b. The State and county in which the site is located.**  
Section 3.1, paragraph 1.
- c. The names and distances to nearby communities, towns and cities.**  
Section 3.1, paragraph 1. and Figures 3-1 and 3-3.
- d. A description of the contours and natural features of the site.**  
Section 3.1, paragraph 1.
- e. The elevation of the site.**  
Section 3.1, paragraph 1.
- f. A description of the man-made features of the site, such as buildings, roads, settling ponds, etc.**  
Section 3.1, paragraph 3 and Figure 3-2
- g. A description of property surrounding the site, including the location of all off-site wells used by nearby communities or individuals.**  
See Figure 3-2 and Section 3.6 ¶1, ¶6, and ¶7 3.7,
- h. The location of the site relative to prominent features such as rivers and lakes. To facilitate presentation of this information, U.S. Geological Survey (USGS) topographic maps may be provided.**  
Section 3.1 and Figures 3-1 & 3-3.
- i. A map that shows the detailed topography of the site using a contour interval (such as 2 feet or 1 meter) and including plot plans, the locations of characterization borings and monitoring wells, and the positions and types of geologic characterization activities.**  
Figure 3-2 is a plot plan. Locations of characterization core borings are in figures in Section 4, Figures 4-6, & 4-8 thru 4-17. Locations of groundwater monitoring wells are in Appendix A. Geologic characterization is discussed in Section 3.5.1 and Appendix A.

**STANDARD REVIEW PLAN CHECKLIST  
C-T PHASE II DECOMMISSIONING PLAN**

- j. The location of the nearest residences and all significant facilities or activities near the site.**

Section 3.2, ¶3 & ¶4, Section 3.3, and Figure 3-2 & 3-3.

- k. A description of the facilities (buildings, parking lots, fixed equipment, etc.) at the site.**

Section 3.1 and Figure 3-2

**3.2 POPULATION DISTRIBUTION**

- l. A summary of the current population in and around the site, by compass vectors.**

Section 3.2. Paragraphs 1, 2, 3.

- m. A summary of the projected population in and around the site by compass vectors.**

Section 3.2, paragraph 5.

- n. A list of minority populations by compass vectors.**

Section 3.2, paragraph 4.

- o. Demographic data by census block group to identify minority or low-income populations.**

Section 3.2, paragraph 4.

**3.3 CURRENT/FUTURE LAND USE**

- p. The decommissioning plan should include a description of the current land uses in and around the site and a summary of anticipated land uses.**

Section 3.3. Table 3-1.

**3.4 METEOROLOGY AND CLIMATOLOGY**

- q. A description of the general climate of the region with respect to types of air masses, synoptic features (high- and low-pressure systems and frontal systems), general air-flow patterns (wind direction and speed), temperature and humidity, precipitation, and relationships between synoptic-scale atmospheric processes and local meteorological conditions.**

Section 3.4, paragraphs 1-6.

- r. Seasonal and annual frequencies of severe weather phenomena including tornados, water spouts, thunderstorms, lightning, hail, and high air pollution potential.**

Section 3.4, paragraph 7. Tables 3-2 & 3-3. Annual frequencies are provided.

## STANDARD REVIEW PLAN CHECKLIST C-T PHASE II DECOMMISSIONING PLAN

- s. **Weather-related radionuclide transmission parameters including average and extreme wind vectors and average and extreme duration and intensity of precipitation events.**  
Section 3.4 paragraph 6, 8, & 9.
- t. **Routine weather-related site deterioration parameters including precipitation intensity and duration, wind vectors, and temperature and pressure gradients.**  
Section 3.4 paragraph 6, 8, & 9.
- u. **Extreme weather-related site deterioration parameters including tornados, water spouts, thunderstorms, hail, and extreme air pollution (from offsite sources).**  
Section 3.4, paragraph 7 & 9
- v. **A description of the local (site) meteorology in temperature, atmospheric water vapor, precipitation, fog, atmospheric stability and air quality.**  
Section 3.4, paragraphs 1-6, 10, 11.
- w. **The national Ambient Air Quality Standards Category of the area in which the facility is located and, if the facility is not in a Category 1 zone, the closest and first downwind Category 1 Zone.**  
Section 3.4, paragraph 12.

### 3.5 GEOLOGY AND SEISMOLOGY

#### 3.5.1 Geology

- x. **A detailed description of the geologic characteristics of the site and the region around the site.**  
Section 3.5.1.
- y. **A discussion of the tectonic history of the region, regional geomorphology, physiography, stratigraphy, and geochronology. All tectonic structures should be identified, in particular folds and faults in the region around the site, and their geologic and structural history should be discussed. The relationship between seismicity and tectonic structures and the earthquake-generating potential of any active structures should be determined.**  
Section 3.5.1, paragraphs 2 thru 5. Site stratigraphy is described in Appendix A.  
Seismology is discussed in §3.5.2.
- z. **A regional tectonic map showing the site location and its proximity to tectonic structures should be provided. Appropriate references of supporting documents should be provided with regional physiographic and topographic maps, geologic and structure maps, fault maps, stratigraphic sections, boring logs, and aerial photographs.**  
Section 3.5.1 Figures 3-4 and 3-5 paragraphs 5 and 6.

## STANDARD REVIEW PLAN CHECKLIST C-T PHASE II DECOMMISSIONING PLAN

- aa. A description of the structural geology of the region and its relationship to the site geologic structure should be discussed. Any faults, folds, open jointing, fractures, and shear zones in the region must be identified, and their significance to the facility should be discussed.**

Section 3.5.1 paragraphs 1 thru 6.

- bb. A description of any crustal tilting, subsidence, karst terrain, landsliding, and erosion.**

Section 3.5.1, paragraphs 9 & 13.

- cc. A description of the surface and subsurface geologic characteristics of the site and its vicinity. The description should include local stratigraphic units and their accepted names, ages, genetic relationships, and lithologies. To facilitate the presentation, these descriptions should be accompanied by appropriately scaled geologic maps, Descriptions of mineralogy, particle size, organic materials, degree of cementation, zones of alteration, and depositional environment of unconsolidated strata should be included.**

See Section 3.5.1, paragraphs 6, 7, & 8, and Appendix A.

- dd. A description of the geomorphology of the site, including USGS topographic maps that emphasize local geomorphic features pertinent to the site. A description of the geomorphic processes affecting the present-day topography of the disposal site and vicinity should be included. Information should include descriptions of processes such as mass wasting, erosion, slumping, landsliding, and weathering where appropriate. The discussion of relevant geomorphic processes should include their rates, frequencies of occurrence, and controlling mechanisms or factors.**

Section 3.5.1, paragraph 6, 7, & 8.

- ee. A description of the location, attitude, and geometry of all known or inferred faults in the site and vicinity. Fault displacements should be identified and potential recurrence intervals addressed.**

Section 3.5.2, paragraph 4 describes the St. Louis fault, the nearest to the site. See also paragraphs 5 and 6.

- ff. A discussion of the nature and rates of deformation such as folding within the site and relate these to the local stress regime. Any joint sets within the site, including their densities and orientations, should be described and their relative ages discussed. Remineralization and mineralization history of the various joint sets should also be discussed. Solution cavities and crevices in the bedrock should be described and discussed, if applicable.**

See Section 3.5.1, paragraph 6.

- gg. A description of any man-made geologic features such as mines or quarries.**

Section 3.5.1, paragraph 10.

## STANDARD REVIEW PLAN CHECKLIST C-T PHASE II DECOMMISSIONING PLAN

### 3.5.2 Seismology

- hh. **A description of the seismicity, tectonic characteristics of the site and region, correlation of earthquake activity with geologic structures and tectonic provinces, maximum earthquake potential, seismic wave transmission characteristics of the site, design earthquake, settlement and liquefaction, and geophysical methods for site characterization.**

Section 3.5.2. See paragraph 6.

- ii. **A complete list of all historical earthquakes that have a magnitude of III or more or a modified Mercalli intensity of IV or more within 320 kilometers (200 miles) of the site. The listing should include all available information about the earthquakes such as epicenter coordinates, depth of focus, origin time, intensity, and magnitude, augmented by a map showing the locations of these earthquakes. The references from which the information was obtained should be indicated. In addition, any earthquake that induced geologic hazard (e.g., landsliding or liquefaction) should be identified, and the acceleration that caused the hazard should be provided.**

SECTION 3.5.2, PARAGRAPHS 3-6. TABLES 3-4 & 3-5.

### 3.6. SURFACE WATER HYDROLOGY

- jj. **A description of site drainage and surrounding watershed fluvial features, including important water users.**

Section 3.6, paragraphs 1, 2, & 3.

- kk. **Water resource data, including maps, hydrographs, and stream records from other agencies (e.g., U.S. Geological Survey and U.S. Army Corps of Engineers).**

Section 3.6, paragraphs 4, 5.

- ll. **Topographic maps of the site that show natural drainages and man-made features.**

See Section 3.6, paragraph 2.

- mm. **A description of the surface water bodies at the site and surrounding areas, including the location, size, shape, and other hydrologic characteristics of all streams, lakes, or coastal areas.**

Section 3.6, paragraph 1.

- nn. **A description of existing and proposed water control structures and diversions (both upstream and downstream that may influence the site).**

See Section 3.6, paragraphs 5 & 8.

## STANDARD REVIEW PLAN CHECKLIST C-T PHASE II DECOMMISSIONING PLAN

- oo. **Flow-duration data that indicate minimum, maximum, and average historical observations for surface water bodies in the site areas.**

See Section 3.6, paragraph 3.

- pp. **Aerial photography and maps of the site and adjacent drainage areas identifying features such as drainage areas, surface gradients, and areas of flooding.**

Not relevant to this urban site protected by a levee.

- qq. **An inventory of all existing and planned surface water users, whose intakes could be adversely affected by migration of radionuclides from the site. The inventory should include the owner, location, type, and amount of use; source of supply; type of intake; and surface water quality data.**

Section 3.6, paragraphs 6 & 7 provide general downstream consumption information.

- rr. **Topographic and/or aerial photographs that delineate the 100-year floodplain at the site.**

Section 3.6, paragraph 5.

- ss. **A description of any man-made changes to the surface water hydrologic system that may influence the potential for flooding at the site. (Such changes may include construction of reservoirs, urban development, strip mining, lumbering, etc.). The description of these changes should include the proximity of the affected area to the site, the surface water bodies affected, the size of the area affected, and the potential effects at the site.**

Section 3.6, paragraphs 5 & 8

### 3.7. GROUNDWATER HYDROLOGY

Decommissioning Plan Appendix A, Groundwater at the St. Louis Downtown Site, summarizes available information describing groundwater in Mallinckrodt's St. Louis Downtown Site. Sources of the information, including investigations by URS Corporation for Mallinckrodt and by Bechtel National for the US Department of Energy and the US Army Corps of Engineers are referenced in Appendix A.

- tt. **A description of the saturated zone:**

Appendix A, Groundwater at the St. Louis Downtown Site, §1.2 "Site Hydrogeology" describes the saturated zone, including groundwater elevations and flow directions.

- uu. **Descriptions of monitoring wells:**

Groundwater monitoring wells on the St. Louis Downtown Site are described in Appendix A, Groundwater at the St. Louis Downtown Site, §1.2.3 "History of Well and Piezometer Installation".

- vv. **Physical parameters:**

## STANDARD REVIEW PLAN CHECKLIST C-T PHASE II DECOMMISSIONING PLAN

Physical parameters that were investigated and reported are discussed in Appendix A, particularly in §1.2.2, "Groundwater" therein.

**ww. A description of groundwater flow directions and velocities**

Potentiometric surfaces, groundwater elevations, and flow directions in the St. Louis Downtown Site are described in Appendix A, particularly in §1.2.4 "Groundwater Flow Directions".

**xx. A description of the unsaturated zone**

Appendix A, Groundwater at the St. Louis Downtown Site, describes the soil type encountered in the unsaturated zone as well as the depth to groundwater.

**yy. Information on all monitor stations including location and depth**

Groundwater monitoring wells on the St. Louis Downtown Site are described in Appendix A, Groundwater at the St. Louis Downtown Site, §1.2.3 "History of Well and Piezometer Installation".

**zz. g. A description of the numerical analyses techniques used to characterize the unsaturated and saturated zones:**

Numerical analysis techniques used to characterize hydrology of the St. Louis Downtown Site include time-series assessments of hydraulic head measurements and calculation of hydraulic conductivity using field-based hydraulic testing data. The results of these analyses are presented in Appendix A, Groundwater at the St. Louis Downtown Site.

**aaa. The distribution coefficients of the radionuclides of interest at the site.**

The Department of Energy (1990) analyzed one soil sample from the St. Louis Downtown Site for the distribution coefficient for uranium and the cation exchange coefficient in accordance with methods ASTM D4319 and ASTM STP805, respectively.

### 3.8. NATURAL RESOURCES

**bbb. A description of the natural resources occurring at or near the site, including metallic and nonmetallic minerals and ores; fuels, such as peat, lignite, and coal; hydrocarbons, including gas, oil, tar sands, and asphalt; geothermal sources; industrial mineral deposits, such as sand and gravel, clays, aggregate sources, shales, and building stone; timber; agricultural lands; and waters in the form of brines.**

Section 3.8, paragraph 1.

**ccc. A description of potable, agricultural, or industrial ground or surface waters including information on resource type, occurrence, location, extent, net worth, recoverability, and current and projected use.**

Section 3.8, paragraph 2.

**STANDARD REVIEW PLAN CHECKLIST  
C-T PHASE II DECOMMISSIONING PLAN**

**ddd. A description of economic, marginally economic, or subeconomic known or identified natural resources as defined in U.S. Geological Survey Circular 831.**

Section 3.8, paragraph 1.

**eee. Mineral, fuel, and hydrocarbon resources near and surrounding the site which, if exploited, would affect the licensee's or responsible party's dose estimates.**

Section 3.8, paragraph 1

**3.9. ECOLOGY/ENDANGERED SPECIES**

**fff. A list of commercially or recreationally important invertebrate species known to occur within 5 kilometers (3.1 miles) of the site.**

Section 3.8, paragraph 3.

**ggg. A list of all commercially important floral species known to occur within 5 kilometers (3.1 miles) of the site.**

Section 3.8, paragraph 3.

**hhh. A list of commercially or recreationally important vertebrate animals known to occur within 5 kilometers (3.1 miles) of the site.**

Section 3.8, paragraph 3.

**iii. Estimates of the relative abundance of both commercially and recreationally important game and nongame vertebrates.**

Section 3.8, paragraph 3.

**jjj. A list of all endangered species at or within 5 kilometers (3.1 miles) of the site.**

Section 3.8, paragraph 4.

# STANDARD REVIEW PLAN CHECKLIST C-T PHASE II DECOMMISSIONING PLAN

## 4.0 RADIOLOGICAL STATUS OF FACILITY

### 4.1. CONTAMINATED STRUCTURES

This section is not applicable. A paragraph is provided for Section 4.1 of the C-T Phase II Decommissioning Plan referring to the C-T Phase I Decommissioning Plan.

- a. A list or description of all structures at the facility where licensed activities occurred that contain residual radioactive material in excess of background levels.
- b. A summary of the structures and locations at the facility that the licensee or responsible party has concluded have not been impacted by licensed operations and the rationale for the conclusion.
- c. A list or description of each room or work area within each of these structures.
- e. A summary of the background levels used during scoping or characterization surveys.
- f. A summary of the locations of contamination (i.e., walls, floors, wall/floor joints, structural steel surfaces, ceilings, etc.) in each room or work area.
- g. A summary of the radionuclides present at each location, the maximum and average radionuclide activities in disintegrations per minute per 100 square centimeters (dpm/100cm<sup>2</sup>) the chemical form of the radionuclide, and, if multiple radionuclides are present, the radionuclide ratios.
- h. The mode of contamination for each surface (i.e., whether the radioactive material is present only on the surface or the material or if it has penetrated the material).
- i. The maximum and average radiation levels in millirem per hour (mrem/hr) or microrem per hour ( $\mu$ rem/hr), as appropriate, in each room or work area.
- j. A scale drawing or map of the rooms or work areas showing the locations of radionuclide material contamination and radiation levels. All maps should include compass direction indicators.

### 4.2. CONTAMINATED SYSTEMS AND EQUIPMENT

Regarding equipment, a paragraph is provided for Section 4.2 of the C-T Phase II Decommissioning Plan referring to the C-T Phase I Decommissioning Plan.

Section 4.2 of the C-T Phase II Decommissioning Plan is completed with respect to systems, specifically underground utilities, and in particular the sewer system.

- a. A list or description and the location of all systems or equipment at the facility that contain residual radioactive material in excess of site background levels;

## STANDARD REVIEW PLAN CHECKLIST C-T PHASE II DECOMMISSIONING PLAN

The 2<sup>nd</sup> and 3<sup>rd</sup> paragraph of the C-T Phase II Decommissioning Plan Section 4.2 set the scope as underground sewer.

- b. A summary of the radionuclides present in each system or on the equipment at each location, the maximum and average radionuclide activities in  $\text{dpm}/100\text{cm}^2$ , the chemical form of the radionuclide, and, if multiple radionuclides are present, the radionuclide ratios;

This information is provided in Table 4-1 of the C-T Phase II Decommissioning Plan. Averages are not provided but could be determined from Table 4-1. Chemical form is not addressed; this topic is inherently addressed in Section 5 of the C-T Phase II Decommissioning Plan.

- c. The maximum and average radiation levels in  $\text{mrem}/\text{hr}$ , or  $\mu\text{rem}/\text{hr}$ , as appropriate, at the surface of each piece of equipment.

This information is not applicable.

- d. A summary of the background levels used during scoping or characterization surveys; and

This information is provided in Section 4.7.1 of the C-T Phase II Decommissioning Plan.

- e. A scale drawing or map of the rooms or work areas showing the locations of the contaminated systems or equipment. All maps should include compass direction indicators.

This information is provided in Figure 4-1 of the C-T Phase II Decommissioning Plan.

### 4.3. SURFACE SOIL CONTAMINATION

- a. A list or description of all locations at the facility where surface soil contains residual radioactive material in excess of site background levels.

This item is addressed by the first two sentences of the C-T Phase II Decommissioning Plan Section 4.3. This item is indirectly addressed by figures 4-2 through 4-5 of the C-T Phase II Decommissioning Plan.

- b. A summary of the background levels used during scoping or characterization surveys.

This item is addressed by the C-T Phase II Decommissioning Plan Section 4.7.1.2.

- c. A summary of the radionuclides present at each location, the maximum and average radionuclide activities in picoCuries per gram ( $\text{pCi}/\text{gm}$ ), the chemical form of the radionuclide, and, if multiple radionuclides are present, the radionuclide ratios.

This information is provided in Table 4-2 of the C-T Phase II Decommissioning Plan. Averages are not provided but could be determined from Table 4-2. Chemical form is not addressed; this topic is inherently addressed in Section 5 of the C-T Phase II Decommissioning Plan.

## STANDARD REVIEW PLAN CHECKLIST C-T PHASE II DECOMMISSIONING PLAN

- d. The maximum and average radiation levels in mrem/hr at each location.

Equivalent information is provided in Table 4-4 of the C-T Phase II Decommissioning Plan. See also Tables 4-2 and 4-3.

- e. A scale drawing or map of the site showing the locations of radionuclide material contamination in surface soil. All maps should include compass direction indicators.

This information is provided in figures 4-2 through 4-5 of the C-T Phase II Decommissioning Plan.

### 4.4. SUBSURFACE SOIL CONTAMINATION

- a. A list or description of all locations at the facility where subsurface soil contains residual radioactive material in excess of site background levels.

This item is addressed by the entirety of C-T Phase II Decommissioning Plan Section 4.4.

- b. A summary of the background levels used during scoping or characterization surveys.

This information is provided directly and by reference in C-T Phase II Decommissioning Plan Section 4.7.1.3.

- c. A summary of the radionuclides present at each location, the maximum and average radionuclide activities in pCi/gm, the chemical form of the radionuclide, and, if multiple radionuclides are present, the radionuclide ratios.

This information is provided in tables 4-6 through 4-17 of the C-T Phase II Decommissioning Plan. Averages are not provided but could be determined from the tables. Chemical form is not addressed; this topic is inherently addressed in Section 5 of the C-T Phase II Decommissioning Plan.

- d. The depth of the subsurface soil contamination at each location.

This information is provided in tables 4-6 through 4-17 of the C-T Phase II Decommissioning Plan.

- e. A scale drawing or map of the site showing the locations of subsurface soil contamination. All maps should include compass direction indicators.

This information is covered in figures 4-6 through 4-19.

### 4.5. SURFACE WATER

A paragraph is provided for Section 4.5 of the C-T Phase II Decommissioning Plan explaining that the topic is not applicable.

## STANDARD REVIEW PLAN CHECKLIST C-T PHASE II DECOMMISSIONING PLAN

- a. A list or description and map of all surface water bodies at the facility that contain residual radioactive material in excess of site background levels.

This information is not applicable to the C-T Phase II Decommissioning Plan.

- b. A summary of the background levels used during scoping or characterization surveys.

This information is not applicable to the C-T Phase II Decommissioning Plan.

- c. A summary of the radionuclides present in each surface water body and the maximum and average radionuclide activities in picoCuries per liter (pCi/l).

This information is not applicable to the C-T Phase II Decommissioning Plan.

### 4.6. GROUNDWATER

Decommissioning Plan §4.6, Groundwater, and Appendix A, Groundwater at the St. Louis Downtown Site, summarize available information describing groundwater at Mallinckrodt's St. Louis Downtown Site. Sources of the information, including investigations by URS Corporation for Mallinckrodt, Bechtel National for the US DOE, and IT Corporation for the USACE, are referenced in Appendix A.

- a. A summary of the aquifer(s) at the facility that contain residual radioactive material in excess of site background levels.

Appendix A, Groundwater at the St. Louis Downtown Site, identifies the groundwater-bearing zones in which radionuclides were detected during groundwater monitoring events.

- b. A summary of the background levels used during scoping or characterization surveys.

Site-specific background levels of radionuclides in groundwater have not been determined at the St. Louis site.

- c. A summary of the radionuclides present in each aquifer and the maximum and average radionuclide activities in pCi/l.

Appendix A, Groundwater at the St. Louis Downtown Site, §1.3 "Groundwater Sampling and Analytical Results", summarizes radioanalytical results from past groundwater sampling events.

The following topic was not included in the SRP checklist but was incorporated in the draft Phase II DP because the information was available and relevant.

### 4.7. CURRENT RADIOLOGICAL STATUS (a summary and conclusion section)

This information is provided in C-T Phase II Decommissioning Plan Section 4.7.

# STANDARD REVIEW PLAN CHECKLIST C-T PHASE II DECOMMISSIONING PLAN

## 5. DOSE MODELING

### UNRESTRICTED RELEASE USING SITE-SPECIFIC INFORMATION

1. Source term information including nuclides of interest, configuration of the source, areal variability of the source, etc.

Radionuclides of interest are in the uranium series, actinium series, and thorium series, described in C-T Phase II Decommissioning Plan, chapter 5, section 5.2 Source Term.

The current configuration and areal variability of the radioactive source are described in C-T Phase II Decommissioning Plan chapter 4, Radioactivity Characterization of the C-T Facility. The final configuration will be that remaining after remediation to the DCGL in §5.8 RESRAD Calculations.

2. Description of the exposure scenario including a description of the critical group.

C-T Phase II Decommissioning Plan, §5.3 Land Use Scenario, §5.4 Critical Group, and §5.5 Environmental Exposure Pathways, describe the exposure scenario and critical group.

3. Description of the conceptual model of the site including the source term, physical features important to modeling the transport pathways, and the critical group.

C-T Phase II Decommissioning Plan, §5.6 Conceptual and Mathematical Models, describes the conceptual model, based on the source term, physical features, and the critical group described in earlier sections of C-T Phase II Decommissioning Plan, §5 Dose Modeling.

Reasons why a groundwater exposure pathway does not exist and is not expected to exist in the future are presented in chapter 5 Dose Modeling, §5.5.3.2 Groundwater, and in C-T Decommissioning Plan, Appendix A.

4. Identification/description of the mathematical model used (e.g., hand calculations, DandD Screen v1.0, RESRAD v5.81, etc.).

C-T Phase II Decommissioning Plan, §5.6 Conceptual and Mathematical Models, describes the mathematical model coded into RESRAD version 6 that were used to derive DCGL.

5. Description of the parameters used in the analysis.

Parameters used in the conceptual and mathematical modeling are described in C-T Phase II Decommissioning Plan §5.5 Environmental Exposure Pathways and in §5.7 Input Parameters.

## **STANDARD REVIEW PLAN CHECKLIST C-T PHASE II DECOMMISSIONING PLAN**

6. Discussion about the effect of uncertainty on the results.

Effects of variability of input parameters on uncertainty of results are discussed in §5.8.4 Sensitivity Analysis.

7. Input and output files or printouts, if a computer program was used.

Parts of RESRAD computer printouts that are relevant to derivation of the DCGL are included in Appendix D to the C-T Phase II Decommissioning Plan.

# STANDARD REVIEW PLAN CHECKLIST C-T PHASE II DECOMMISSIONING PLAN

## 6.0 ALTERNATIVES CONSIDERED AND RATIONALE FOR CHOSEN ALTERNATIVE

### 6.1. ALTERNATIVES CONSIDERED

- a. A description of the facility if the alternative is employed.  
Adequate information is provided in Section 6.1 of the C-T Phase II Decommissioning Plan. Phase II Plan §8 describes proposed remediation activities for the preferred alternative.
- b. A summary of the health effects on adjacent communities if the alternative is employed.  
Adequate information is provided in Section 6.1 of the C-T Phase II Decommissioning Plan. Safety of NRC-authorized transfer of solid waste to an off-site disposal facility (WCS in Texas or USEcology in Idaho) has been demonstrated.
- c. A summary of the impacts on community resources such as land use and property values.  
Adequate information is provided in Section 6.1 of the C-T Phase II Decommissioning Plan. Need information for off site disposal.
- d. A summary of the impacts on the geology, hydrology, air quality and ecology in and around the site.  
Adequate information is provided in Section 6.1 of the C-T Phase II Decommissioning Plan. Need information for off site disposal.
- e. A description of impacts on minority or low-income populations within a 1 kilometer (0.6 mile) radius of the center of the facility (urban location) or within a 6.4 kilometer (4 mile) radius of the center of the facility (rural location).  
This information is provided in Section 6.1 of the C-T Phase II Decommissioning Plan.
- f. If appropriate, an assessment of the potential for criticality.  
This item is not applicable.
- g. A summary of the irreversible and irretrievable commitment of resources.  
Adequate information is provided in sections 6.1.1.6, 6.1.2.6, 6.1.3.6, and 6.1.4.6 of the C-T Phase II Decommissioning Plan.
- h. An analysis of the proposed alternative and other alternatives as required by 10 CFR 51.45(c).  
Adequate information is provided in Section 6.1 of the C-T Phase II Decommissioning Plan.
- i. A list of the permits, licenses, approvals, and other entitlements, and a discussion of the status of compliance with these requirements required in 10 CFR 51.45(d).

## STANDARD REVIEW PLAN CHECKLIST C-T PHASE II DECOMMISSIONING PLAN

This information is in Section 6.3 of the C-T Phase II Decommissioning Plan.

### 6.2. RATIONALE FOR CHOSEN ALTERNATIVE

- a. A description of why the licensee selected the preferred alternative described in the decommissioning plan.

This information is provided in Section 6.2 of the C-T Phase II Decommissioning Plan.

- b. If the licensee has not selected the environmentally preferable alternative, an explanation of why this alternative was not selected.

This item is not applicable to the site.

# STANDARD REVIEW PLAN CHECKLIST C-T PHASE II DECOMMISSIONING PLAN

## 7.0 ALARA ANALYSIS

1. A description of how the licensee or responsible party will achieve a decommissioning goal below the dose limit.

Chapter 7 summarizes an analysis to estimate whether remediation to satisfy DCGL proposed in Chapter 5 would also be as low as reasonably achievable (ALARA). The analysis demonstrates that the  $DCGL_W$  and  $DCGL_{EMC}$  are ALARA.

2. A quantitative cost-benefit analysis.

An estimate of the benefit of reduction in radiological dose is summarized in Chapter 7, §7.3 "Estimation of Benefits." An estimate of the costs of achieving the benefits is summarized in §7.4 "Estimation of Costs." A quantitative cost-benefit comparison is reported in §7.5 "ALARA Residual Radioactivity."

Two cost-benefit analyses were performed. The first, summarized in §7.5.1, evaluates whether, beginning at  $DCGL_W$ , an additional increment of cleanup would be cost-effective to perform. The second, summarized in §7.5.2, estimates how far above the  $DCGL_W$  the cost-benefit balance level would occur.

3. A description of how costs were estimated.

Costs were estimated as the increment of costs necessary to achieve and additional 0.25 increment of reduction in residual radioactivity concentration in soil. That is, costs directly incurred in order to remove an additional increment of 24000 ft<sup>3</sup> of soil (not including what would be required to clean down to  $DCGL_W$ ) are included in the incremental cost estimate. These incremental costs include labor, technical, supervisory, and managerial personnel during an additional increment of about 20 work days needed to excavate the additional 24000 ft<sup>3</sup> of soil. The incremental costs include rental of equipment, including excavator, loaders, trucks, and health and safety instrumentation necessary to excavate the additional 24000 ft<sup>3</sup> of soil. The cost estimate includes an increment of imported soil to backfill the increment of excavation. The cost estimate includes an additional month of rail car loading, cost of transporting 24000 ft<sup>3</sup> of soil to a disposal facility, and cost of disposal at facility to which the NRC will authorize transfer.

The evaluation also includes estimates of the monetary equivalent costs of radiological risk to workers during remediation, of risks to workers from other industrial workplace accidents, and risk to members of the public consequent to rail transportation.

**STANDARD REVIEW PLAN CHECKLIST  
C-T PHASE II DECOMMISSIONING PLAN**

4. A demonstration that the doses to the average member of the critical group are ALARA.

An analysis to estimate whether remediation to satisfy DCGL proposed in Chapter 5 would also be as low as reasonably achievable (ALARA) is summarized in Chapter 7. A quantitative cost-benefit comparison is reported in §7.5 "ALARA Residual Radioactivity." demonstrates that the  $DCGL_w$  and  $DCGL_{EMC}$  are ALARA.

# STANDARD REVIEW PLAN CHECKLIST C-T PHASE II DECOMMISSIONING PLAN

## 8. PLANNED DECOMMISSIONING ACTIVITIES

### 8.1 INTRODUCTION

This introductory text is not required by the Standard Review Plan.

### 8.2 CONTAMINATED STRUCTURES

C-T process and support buildings, above-grade structures, were subject to the C-T Phase I Decommissioning Plan.

- a. **A summary of the remediation tasks planned for each room or area in the contaminated structure in the order in which they will occur, including which activities will be conducted by licensee staff and which will be performed by a contractor;**  
Section 8.2, paragraph 1.
- b. **A description of the remediation techniques (such as scabbling, hydrolazing or grit blasting) that will be employed in each room or area of the contaminated structure;**  
Section 8.2, paragraph 1.
- c. **A summary of the radiation protection methods (such as personal protective equipment (PPE) step-off pads and exit monitoring) and control procedures (such as scabbler shrouds, HEPA vented enclosures or superfine water misting) that will be employed in each room or area;**  
Section 8.2, paragraph 1.
- d. **A summary of the procedures already authorized under the existing license and those for which approval is being requested in the decommissioning plan;**  
Section 8.2, paragraph 1.
- e. **A commitment to conduct decommissioning activities in accordance with written, approved procedures;**  
Section 8.2 , paragraph 1.
- f. **A summary of any unique safety or remediation issues associated with remediating any contaminated structure or piece of equipment; and**  
Section 8.2, paragraph 1.

## STANDARD REVIEW PLAN CHECKLIST C-T PHASE II DECOMMISSIONING PLAN

### 8.3 PAVEMENT AND SLABS

- a. **A summary of the remediation tasks planned [for pavement and slabs] in the order in which they will occur, including which activities will be conducted by licensee staff and which will be performed by a contractor;**

Sections 8.3.1 through 8.3.4.

- b. **A description of the techniques (such as scabbling, hydrolazing or grit blasting) that will be employed to remediate [pavement and slabs] in the facility or site.**

Sections 8.3.1 through 8.3.4.

- c. **A description of the radiation protection methods (such as personal protective equipment (PPE) step-off pads and exit monitoring) and control procedures (such as scabbler shrouds, HEPA vented enclosures or superfine water misting) that will be employed while remediating [pavement and slabs];**

Section 8.3.4.

- d. **A summary of the [pavement and slabs] that will be removed or decontaminated and how the decontamination will be accomplished;**

Section 8.3.1 through 8.3.3 and Figures 14-1A and 14-1B.

- e. **A summary of the procedures already authorized under the existing license and those for which approval is being requested in the decommissioning plan;**

Section 8.3.4, paragraph 4.

- f. **A commitment to conduct decommissioning activities in accordance with written, approved procedures;**

Section 8.3.4, paragraphs 1 and 4.

- g. **A summary of any unique safety or remediation issues associated with remediating any [pavement or slab].**

Section 8.3.4, paragraph 2.

### 8.4 CONTAMINATED SYSTEMS AND EQUIPMENT

- a. **A summary of the remediation tasks planned for each system in the order in which they will occur, including which activities will be conducted by licensee staff and which will be performed by a contractor;**

Sections 8.4.2 through 8.4.5 and 8.4.8.

- b. **A description of the techniques (such as scabbling, hydrolazing or grit blasting) that will be employed to remediate each system in the facility or site.**

Sections 8.4.2 through 8.4.5.

## STANDARD REVIEW PLAN CHECKLIST C-T PHASE II DECOMMISSIONING PLAN

- c. A description of the radiation protection methods (such as personal protective equipment (PPE) step-off pads and exit monitoring) and control procedures (such as scabbler shrouds, HEPA vented enclosures or superfine water misting) that will be employed while remediating each system;**  
Section 8.4.5.
- d. A summary of the equipment that will be removed or decontaminated and how the decontamination will be accomplished;**  
Section 8.4.2 and 8.4.5 .
- e. A summary of the procedures already authorized under the existing license and those for which approval is being requested in the decommissioning plan;**  
Section 8.4.8, paragraph 1.
- f. A commitment to conduct decommissioning activities in accordance with written, approved procedures;**  
Section 8.4.8, paragraph 1.
- g. A summary of any unique safety or remediation issues associated with remediating any system or piece of equipment; and**  
Section 8.4.8, paragraph 3.

### 8.5 SOIL,

- a. A summary of the removal/remediation tasks planned for surface and subsurface soil at the site in the order in which they will occur including which activities will be conducted by licensee staff and which will be performed by a contractor.**  
Section 8.5 paragraph 1, and § 8.5.1 through § 8.5.3.
- b. A description of the techniques that will be employed to remove or remediate surface and subsurface soil at the site.**  
Section 8.5.1 through 8.5.3.
- c. A description of the radiation protection methods (such as PPE, or area exit monitoring) and control procedures (such as the use of HEPA vented enclosures during excavation or covering soil piles to prevent wind dispersion) that will be employed during soil removal/remediation. .**  
Section 8.5.3.
- d. A summary of the procedures already authorized under the existing license and those for which approval is being requested in the decommissioning plan.**  
Section 8.5.3, paragraph 6.
- e. A commitment to conduct decommissioning activities in accordance with written, approved procedures.**

## STANDARD REVIEW PLAN CHECKLIST C-T PHASE II DECOMMISSIONING PLAN

Section 8.5.3, paragraph 6.

- f. **A summary of any unique safety or removal/remediation issues associated with remediating the soil.**

Section 8.5.3, paragraph 5.

### 8.6 SURFACE AND GROUNDWATER

- a. **A summary of the remediation tasks planned for ground and surface water in the order in which they will occur, including which activities will be conducted by licensee staff and which will be performed by a contractor.**

Section 8.6.

- b. **A description of the remediation techniques that will be employed to remediate the ground or surface water.**

This information is not applicable for surface water; otherwise, this information is not provided in the C-T Phase II Decommissioning Plan.

- c. **A description of the radiation protection methods and control procedures that will be employed during ground and surface water remediation.**

Not applicable as no decommissioning activity will be performed.

- d. **A summary of the procedures already authorized under the existing license and those for which approval is being requested in the decommissioning plan.**

Not applicable as no decommissioning activity will be performed.

- e. **A commitment to conduct decommissioning activities in accordance with written, approved procedures.**

Not applicable as no decommissioning activity will be performed.

- f. **A summary of any unique safety or removal/remediation issues associated with remediating the ground or surface.**

Not applicable as no decommissioning activity will be performed.

### 8.7 FINAL RADIATION SURVEY

This section is not included in the SRP checklist but is included here because the information is relevant. Final radiation status survey guidance is in section 14.

### 8.8 SITE RESTORATION

This section is not included in the SRP checklist but is included here because the information is relevant.

**STANDARD REVIEW PLAN CHECKLIST  
C-T PHASE II DECOMMISSIONING PLAN**

**8.9 SCHEDULE**

- a. **A Gantt or PERT chart detailing the proposed remediation tasks in the order in which they will occur and including the amount of time required to perform each decommissioning activity and the initiation and completion dates for the activities;**

Figure 8-1

- b. **A statement acknowledging that the dates in the schedule are contingent on NRC approval of the decommissioning plan;**

Section 8.9.

- c. **A statement acknowledging that circumstances can change during decommissioning, and, if the licensee determines that the decommissioning cannot be completed as outlined in the schedule, the licensee or responsible party will provide an updated schedule to NRC; and,**

Section 8.9.

- d. **If the decommissioning is not expected to be completed within the timeframes outlined in NRC regulations at 10 CFR 30.36(h)(1), 10 CFR 40.42(h)(1), or 72.54(j)(1), the staff should verify that the licensee has requested an alternative schedule for completing the decommissioning and has addressed the criteria in NRC regulations at 10 CFR 30.36(h)(2)(i)(1-5), 10 CFR 40.42(h)(2)(i)(1-5), 70.38(h)(2)(i)(1-5), or 72.54(k)(1-5).**

Section 8.9.

# STANDARD REVIEW PLAN CHECKLIST C-T PHASE II DECOMMISSIONING PLAN

## 9. PROJECT MANAGEMENT AND ORGANIZATION

### 9.1 DECOMMISSIONING MANAGEMENT ORGANIZATION

- a. **A description of the decommissioning organization, including descriptions of the individual decommissioning project units within the decommissioning project; organization, such as project management, health and safety, remedial activities, etc.;**  
Section 9.1.1, paragraphs 1-5.
- b. **A description of the responsibilities of each of these decommissioning project units;**  
Sections 9.1.1 through 9.1.7.
- c. **A description of the reporting hierarchy within the decommissioning project management organization, including a chart or diagram showing the relationship of each decommissioning project unit to other project units and decommissioning project management; and**  
Sections 9.1.1 through 9.1.7 and Figure 9-1.
- d. **A description of the responsibility and authority of each unit to ensure that decommissioning activities are conducted in a safe manner and in accordance with approved written procedures, including stop-work authority of each unit and the manner in which concerns about safety issues are managed within the overall decommissioning project.**  
Sections 9.1.1 through 9.1.7.

### 9.2 DECOMMISSIONING TASK MANAGEMENT

- e. **A description of the manner in which the decommissioning tasks are managed, such as through the use of a RWPs;**  
Section 9.2
- f. **A description of how individual decommissioning tasks are evaluated and how the RWPs are developed for each task;**  
Sections 9.2.4 and 9.2.5 provide for safety permits. These sections provide for a procedure that will specify how a decommissioning task is evaluated and a safety permit is developed.
- g. **A description of how the RWPs are reviewed and approved by the decommissioning project management organization;**  
Sections 9.2.3, 9.2.4 and 9.2.5 provide for safety permits. An administrative control plan, specified in section 9.2.1 specifies how a safety permit is reviewed and approved.

## STANDARD REVIEW PLAN CHECKLIST C-T PHASE II DECOMMISSIONING PLAN

- h. A description of how RWPs are managed throughout the decommissioning project (i.e., how they are issued, maintained, revised, and terminated); and**

An administrative controls plan, specified in Section 9.2.1 paragraph 2, specifies how a safety permit is administered.

- i. A description of how individuals performing the decommissioning tasks are informed of the procedures in the RWP, including how they are initially informed and how they are informed when an RWP is revised or terminated.**

Sections 9.2.3 through 9.2.6.

### 9.3 DECOMMISSIONING MANAGEMENT POSITIONS AND QUALIFICATIONS

- j. A description of the duties and responsibilities of each management position in the decommissioning organization and the reporting responsibility of the position;**

Section 9.1.1, Figure 9-1, and Section 9.3

- k. A description of the duties and responsibilities of each chemical, radiological, physical and occupational safety-related position in the decommissioning organization, and the reporting responsibility of the position:**

Section 9.1.3, 9.1.4, 9.1.5, 9.1.6, 9.3.2, 9.3.3, and 9.3.4, .

- l. A description of the duties and responsibilities of each engineering, quality assurance and waste management position in the decommissioning organization and the reporting responsibilities of their respective positions:**

Section 9.1.2, 9.1.4, 9.1.6, 9.1.7, 9.3.1, 9.3.3, 9.3.5, and 9.3.6

- m. The minimum qualifications for each of the positions described above, and the qualifications of the individuals currently occupying the positions (the licensee should also commit to providing the staff with the qualifications of any newly hired or replacements for these positions); and**

Section 9.3, including Sections 9.3.1 through 9.3.7.

- n. A description of all decommissioning and safety committees including the membership of the committees, the duties and responsibilities of each committee and the authority of each committee.**

Mallinckrodt administers C-T decommissioning in accordance with an administrative control plan with review and approval of administrative documents specified. The administrative control plan is provided for in Section 9.2.1.

#### 9.3.1 Radiation Safety Officer

- o. A description of the health physics and radiation safety education and experience required for individuals acting as the RSO;**

Section 9.3.2 and 9.3.4.

## STANDARD REVIEW PLAN CHECKLIST C-T PHASE II DECOMMISSIONING PLAN

**p. A description of the responsibilities and duties of the RSO; and**

Duties and responsibilities of Mallinckrodt's RSO are described in Section 9.1.3.  
Duties and responsibilities of the contractor's Radiation Protection, Health, & Safety Manager are described in Section 9.1.5.

**q. A description of the specific authority of the RSO to implement and manage the licensee's or responsible party's radiation protection program, including the RSO's access and "stop-work" authority for all activities involving radioactive material at the site.**

Authority of Mallinckrodt's RSO is described in Section 9.1.3.  
Authority of the contractor's Radiation Protection, Health, & Safety Manager is described in Section 9.1.5

### 9.4 TRAINING

**r. A description of the radiation safety training that the licensee will provide to each employee including pre-employment, annual/periodic training and specialized training to comply with 10 CFR Part 19;**

Training is described in Section 9.4. Radiation safety training is described in Sections 9.4.3 through 9.4.4.2.

**s. A description of any daily worker "jobside" or "tailgate" training that will be provided at the beginning of each workday or job task to familiarize workers with job-specific procedures or safety requirements; and**

Section 9.4.2, paragraph 2, 9.4.3, and 9.4.5.

**t. A description of the documentation that will be maintained to demonstrate that training commitments are being met.**

Section 9.4.3 ¶2, and 9.4.5.

### 9.5 CONTRACTOR SUPPORT

**u. A summary of decommissioning tasks that will be performed by contractors, including areas at the site where they will perform these tasks;**

Section 9.1.1, and 9.1.2.

**v. A description of the management interfaces that will be in place between the licensee or responsible party's management and on-site supervisors, and contractor management and on-site supervisors;**

Section 9.1 and Figure 9-1.

**w. A description of the oversight responsibilities and authority that the licensee or responsible party will exercise over contractor personnel;**

Section 9.1, especially 9.1.1, 9.1.2, 9.1.3, and 9.1.7.

**STANDARD REVIEW PLAN CHECKLIST  
C-T PHASE II DECOMMISSIONING PLAN**

- x. **A description of the training that will be provided to contractor personnel by the licensee or responsible party, and the training that will be provided by the contractor; and**

Section 9.4, paragraph 1.

- y. **A commitment that the contractor will comply with all radiation safety and license requirements at the facility.**

Sections 9.1.1 ¶4, 9.1.4, and 9.4 ¶ 1.

# STANDARD REVIEW PLAN CHECKLIST C-T PHASE II DECOMMISSIONING PLAN

## 10. RADIATION SAFETY AND HEALTH PROGRAM DURING DECOMMISSIONING

### 10.1. RADIATION SAFETY CONTROLS AND MONITORING FOR WORKERS

#### 10.1.1 Workplace Sampling Program

- a. A demonstration that the air sampling program is representative of the workers breathing zones and will be initiated whenever a worker's intake is likely to exceed the criteria in 20.1502(b);  

Adequate information is provided by commitment to monitoring by air samples in breathing zone when required by 10CFR Part 20.1502(b). In accordance with RG 8.25, lapel samplers are representative of breathing zone without further demonstration.
- b. A description of the criteria used for selection of the placement of air samplers in work areas where potential for airborne hazards exists;  

Adequate information is provided in the C-T Phase II Decommissioning Plan at Section 10.1.1.1 by reference to use of RG 8.25.
- c. A description of the criteria demonstrating that air samplers with appropriate sensitivities will be used; and that samples will be collected at appropriate frequencies;  

This information is not specifically provided in the C-T Phase II Decommissioning Plan. It is assumed by default and reference to RG 8.25 that sensitivities and frequencies will be appropriate.
- d. A description of the conditions under which constant air monitors (CAMs) (or similar equipment), general air and breathing zone samplers will be used, including a description of their readouts, annunciators, and alarm setpoints;  

Adequate information provided in the C-T Phase II Decommissioning Plan at Section 10.1.1.1.
- e. A description of the criteria used to determine the frequency of calibration of the flow meters on the air samplers;  

Adequate information is provided in the C-T Phase II Decommissioning Plan at Section 10.1.1.1.
- f. A description of the action levels for air sampling results, including the actions to be taken when they are exceeded; and  

Adequate information is provided in the C-T Phase II Decommissioning Plan at Section 10.1.1.2.
- g. A description of how minimum detectable activities (MDAs) for each specific radionuclide that may be collected in air samples are determined.

## STANDARD REVIEW PLAN CHECKLIST C-T PHASE II DECOMMISSIONING PLAN

This information is not specifically provided in the C-T Phase II Decommissioning Plan. It is assumed by reference that such will be determined in accordance with RG 8.25.

### 10.1.2 Respiratory Protection Program

- a. A description of the process controls, engineering controls, or procedures to control concentrations of radioactive materials in air;  
Description of such is not provided, but a statement that these will be used is included in the C-T Phase II Decommissioning Plan at Section 10.1.6.1.
- b. A description of the evaluation that will be performed when it is not practical to apply engineering controls or procedures, and demonstrates that the use of respiratory protection equipment is ALARA;  
This information is not specifically provided in the C-T Phase II Decommissioning Plan. Since there are no radiation or high radiation areas, the classic application (trade between external and internal) is not applicable.
- c. A description of the considerations used to demonstrate that respiratory protection equipment is appropriate for a specific task, based on the guidance on assigned protection factors (APR);  
This information is not specifically provided but is implied at Section 10.1.2 "Selection" of the C-T Phase II Decommissioning Plan.
- d. A description of the medical screening and fit testing required before workers will use any respirator that is assigned a protection factor (APF);  
Adequate information is provided by the commitment to perform each. There is no reason to restate the regulations.
- e. A description of the written procedures maintained to address all the elements of the respiratory protection program;  
This information is not specifically provided, however a commitment to manage the program in accordance with written procedures is included at the beginning of Section 10.1.2 of the C-T Phase II Decommissioning Plan.
- f. A description of the use, maintenance, and storage of respiratory protection devices in such a manner that they are not modified and are in like-new condition at the time of issue;  
Adequate information is provided in the C-T Phase II Decommissioning Plan within subsections of Section 10.1.2.
- g. A description of the respiratory equipment users training program; and  
Adequate information is provided in the C-T Phase II Decommissioning Plan within subsections of Section 10.1.2.

## STANDARD REVIEW PLAN CHECKLIST C-T PHASE II DECOMMISSIONING PLAN

- h. A description of the considerations made when selecting respiratory protection equipment to mitigate existing chemical or other respiratory hazards instead of (or in addition to) radioactive hazards.

This information is not specifically provided, however it is implied within Section 10.1.2 "Selection" of the C-T Phase II Decommissioning Plan.

### 10.1.3 Internal Exposure Determination

- a. A description of the monitoring to be performed to determine worker exposure during routine operations, special operations, maintenance and clean-up activities;

Adequate information is provided in the C-T Phase II Decommissioning Plan at Section 10.1.3.

- b. A description of how worker intakes are determined using measurements of quantities of radionuclides excreted from, or retained in the human body. The licensee or responsible party will include in its description the following:

Adequate information is provided in the C-T Phase II Decommissioning Plan at Section 10.1.3 by reference to RG 8.34, 8.9, and 8.36.

- i. How frequencies for bioassay measurements for baseline, periodic, special, and termination assays are assigned;
- ii. How radioactivity measured in the human body by bioassay techniques are converted into worker intake;
- iii. Action levels for bioassay samples, actions to be taken when they are exceeded, and their technical bases;

- c. A description of how worker intakes are determined by measurements of the concentrations of airborne radioactive materials in the workplace. To determine worker intake by measurements of the concentrations of airborne radioactive materials in the workplace, the licensee or the responsible party will include the following:

Adequate information is provided by reference to RG 8.34 in the C-T Phase II Decommissioning Plan at Section 10.1.3.

- i. How airborne concentrations of radioactivity are measured;
- ii. How airborne concentrations are converted to determine intakes;
- iii. Action levels for a worker's intake based on dose, and actions to be taken when they are exceeded; and
- iv. Action levels for a worker's intake based on chemical toxicity if soluble uranium is present in the work area.

- d. A description of how worker intakes, for an adult, a minor, and a declared pregnant woman are determined using any combination of the measurements above, as necessary; and

Adequate information is provided in the C-T Phase II Decommissioning Plan at Section 10.1.3 by reference to RG 8.34, 8.9, and 8.36.

## STANDARD REVIEW PLAN CHECKLIST C-T PHASE II DECOMMISSIONING PLAN

- e. A description of how worker intakes are converted into committed effective dose equivalent (and organ-specific committed dose equivalent), including how the intake of radioactivity by a declared pregnant woman will be converted into a dose to the embryo/fetus.

Adequate information is provided in the C-T Phase II Decommissioning Plan at Section 10.1.3 by reference to RG 8.34, 8.9, and 8.36.

### 10.1.4 External Exposure Determination

- a. A description of the individual-monitoring devices which will be provided to workers who meet the criteria in 10 CFR 20.1502(a) and 20.1601 for external exposures;  
Adequate description is provided in the C-T Phase II Decommissioning Plan at Section 10.1.4.
- b. A description of the type, range, sensitivity, and accuracy of each individual-monitoring device;  
This information is not provided in the C-T Phase II Decommissioning Plan. It is assumed intuitive that standard TLD will be acceptable, especially noting that there are no radiation areas.
- c. A description of the use of extremity and whole body monitors when the external radiation field is non-uniform;  
Adequate information is provided in the C-T Phase II Decommissioning Plan at Section 10.1.4.
- d. A description of when audible-alarm dosimeters and pocket dosimeters will be provided and a description of their performance specifications;  
This information is not provided in the C-T Phase II Decommissioning Plan because it is not applicable to this project.
- e. A description of how external dose from airborne radioactive material is determined;  
This information is not provided in the C-T Phase II Decommissioning Plan because it is not applicable to this project.
- f. A description of the procedure to insure that surveys necessary to supplement personnel monitoring are performed; and  
This information is not specifically provided but a commitment to perform such is in the C-T Phase II Decommissioning Plan at Section 10.1.6.2.
- g. A description of the action levels for worker's external exposure, and the technical bases and actions to be taken when they are exceeded.  
Adequate information is provided in the C-T Phase II Decommissioning Plan at Section 10.1.4.

## STANDARD REVIEW PLAN CHECKLIST C-T PHASE II DECOMMISSIONING PLAN

### 10.1.5 Summation of Internal and External Exposures

The following descriptions are provided in the C-T Phase II Decommissioning Plan at Section 10.1.5 by reference to RG 8.34.

- a. A description of how the internal and external monitoring results are used to calculate Total Organ Dose Equivalent (TODE) and Total Effective Dose Equivalent (TEDE) doses to occupational workers;
  - b. A description of how internal doses to the embryo/fetus, which is based on the intake of an occupationally-exposed, declared, pregnant woman will be determined;
  - c. A description of the monitoring of the intake of a declared, pregnant woman if determined to be necessary; and
  - d. A description of the program for the preparation, retention and reporting of records for occupational radiation exposures.

### 10.1.6 Contamination Control Program

- a. A description of the written procedures to control access to, and stay time in, contaminated areas by workers if they are needed;

A description of procedures is not provided but a description of the types of controls to be used is included in the C-T Phase II Decommissioning Plan within Section 10.1.6.
- b. A description of surveys to supplement personnel monitoring for workers during routine operations, maintenance, clean-up activities, and special operations;

Adequate information is provided in the C-T Phase II Decommissioning Plan at Section 10.1.6.2.
- c. A description of the surveys which will be performed to determine the baseline of background radiation levels and radioactivity from natural sources for areas where decommissioning activities will take place;

Information is provided in C-T Phase II Decommissioning Plan Section 4 and in the C-T Characterization Survey Report.
- d. A description in matrix or tabular form which describes contamination action limits (that is, actions taken to either decontaminate a person, place or area, or restrict access, or modify the type or frequency of radiological monitoring);

Adequate information is provided in the C-T Phase II Decommissioning Plan within Section 10.1.6.
- e. A description (included in the matrix or table mentioned above) of proposed radiological contamination guidelines for specifying and modifying the frequency for each type of survey used to assess the reduction of total contamination; and,

## STANDARD REVIEW PLAN CHECKLIST C-T PHASE II DECOMMISSIONING PLAN

This information is not specifically provided in the C-T Phase II Decommissioning Plan.

- f. A description of the procedures used to test sealed sources, and to insure that sealed sources are leak tested at appropriate intervals.

This information is not applicable.

### 10.1.7 Instrumentation Program

- a. A description of the instruments to be used to support the health and safety program including the manufacturer's name, the intended use of the instrument, the number of units available for the intended use, the ranges on each scale, the counting mode and the alarm set-points;

Adequate information is provided by Table 10-1 in the C-T Phase II Decommissioning Plan.

- b. A description of instrumentation storage, calibration and maintenance facilities for instruments used in field surveys, including on-site facilities used for laboratory analyses of samples collected during survey;

This information is not provided in the C-T Phase II Decommissioning Plan. Assumed instruments will be managed in accordance with standard industry practice.

- c. A description of the method used to estimate the Minimum Detectable Concentration (MDC) or Minimum Detectable Activity (MDA) (at the 95% confidence level) for each type of radiation to be detected;

This information is provided in the C-T Phase II Decommissioning Plan, Appendix E.

- d. A description of the instrument calibration and quality assurance procedures;

This item is addressed in C-T Phase II Decommissioning Plan at Section 10.1.7 and Section 13.4.

- e. A description of the methods used to estimate uncertainty bounds for each type of instrumental measurement; and

This information is not provided in the C-T Phase II Decommissioning Plan.

- f. A description of air sampling calibration procedures or a statement that the instruments will be calibrated by an accredited laboratory.

This item is addressed in C-T Phase II Decommissioning Plan at Section 10.1.7 and Section 13.4.

## STANDARD REVIEW PLAN CHECKLIST C-T PHASE II DECOMMISSIONING PLAN

### 10.2. NUCLEAR CRITICALITY SAFETY

This section is not applicable to the C-T Phase II Decommissioning Plan.

### 10.3. HEALTH PHYSICS AUDITS, INSPECTIONS AND RECORD-KEEPING PROGRAM

- a. A general description of the annual program review conducted by executive management;  
Adequate information is provided in the C-T Phase II Decommissioning Plan at Section 10.3.
- b. A description of the records to be maintained of the annual program review and executive audits;  
Adequate information is provided in the C-T Phase II Decommissioning Plan at Section 10.3.
- c. A description of the types and frequencies of surveys and audits to be performed by the RSO and RSO staff. These surveys and audits should be frequent enough to ensure close communications and proper surveillance of individual radiation workers. Applicants should consider developing survey and audit schedules based on activity and use (*e.g.*, highly contaminated areas or facilities involving volatile radioactive materials may be audited weekly or biweekly, moderately contaminated areas or facilities may be audited monthly, and slightly contaminated facilities may be audited quarterly). The audit program should include routine unannounced inspections;  
Adequate information is provided in the C-T Phase II Decommissioning Plan, Section 13.
- d. A description of the process used in evaluating and dealing with violations of NRC requirements or license commitments identified during audits.  
This information is not specifically provided in the C-T Phase II Decommissioning Plan. It is addressed in quality assurance procedures.
- e. A description of the records maintained of RSO audits, for example, the date of each audit, name of the person(s) who conducted the audit, persons contacted by the auditor(s), areas audited, audit findings, corrective actions, and follow-up.  
This information is not specifically provided in the C-T Phase II Decommissioning Plan. (This is procedure level detail: it does not belong in the Decommissioning Plan.)

# STANDARD REVIEW PLAN CHECKLIST C-T PHASE II DECOMMISSIONING PLAN

## 11.0 ENVIRONMENTAL MONITORING AND CONTROL PROGRAM

### 11.1. ENVIRONMENTAL ALARA EVALUATION PROGRAM

**a. A description of ALARA goals for effluent control;**

This information is provided in Section 11.1.1 of the C-T Phase II Decommissioning Plan.

**b. A description of the procedures, engineering controls, and process controls to maintain doses ALARA (may be discussed under section 11.3 below);**

This information is provided in Section 11.1.2 of the C-T Phase II Decommissioning Plan.

**c. A description of the ALARA reviews and reports to management;**

This information is provided in Section 11.1.3 of the C-T Phase II Decommissioning Plan.

### 11.2. EFFLUENT MONITORING PROGRAM

**a. A demonstration that background and baseline concentrations of radionuclides in environmental media have been established through appropriate sampling and analysis;**

This information is not provided. Baseline concentrations are not available.

**b. A description of the known or expected concentrations of radionuclides in effluents;**

This information is provided in Section 11.2.1 of the C-T Phase II Decommissioning Plan.

**c. A description of the physical and chemical characteristics of radionuclides in effluents;**

This information is provided in Section 11.2.2 of the C-T Phase II Decommissioning Plan.

**d. A summary or diagram of all effluent discharge locations;**

This information is provided in Section 11.2.4 of the C-T Phase II Decommissioning Plan.

**e. A demonstration that samples will be representative of actual releases;**

This information is provided in Sections 11.2.4 and 11.2.5 of the C-T Phase II Decommissioning Plan.

**f. A summary of sample collection and analysis procedures, including the minimum detectable concentrations of radionuclides (if this information is not already described in Section 10 of the SRP);**

This information is provided in Section 11.2.5 of the C-T Phase II Decommissioning Plan.

## STANDARD REVIEW PLAN CHECKLIST C-T PHASE II DECOMMISSIONING PLAN

**g. A summary of the sample collection frequencies;**

This information is provided in Sections 11.2.5 and 11.2.6 of the C-T Phase II Decommissioning Plan.

**h. A description of the environmental monitoring recording and reporting procedures;**

This information is provided in Section 11.2.7 of the C-T Phase II Decommissioning Plan.

**i. A description of the quality assurance program to be established and implemented for the effluent monitoring program (if this is not already described under Section 13 of the SRP checklist;**

This information is provided in Section 11.2.8 of the C-T Phase II Decommissioning Plan by reference to Section 13.

### 11.3. EFFLUENT CONTROL PROGRAM

**a. A description of the controls that will be used to minimize releases of radioactive material to the environment;**

This information is provided in Section 11.3.1 of the C-T Phase II Decommissioning Plan.

**b. A summary of the action levels and description of the actions to be taken should a limit be exceeded;**

This information is provided in Section 11.3.2 of the C-T Phase II Decommissioning Plan.

**c. A description of the leak detection systems for ponds, lagoons, and tanks;**

This information is provided in Section 11.3.3 of the C-T Phase II Decommissioning Plan.

**d. A description of the procedures to ensure that releases to sewer systems are controlled and maintained to meet the requirements of 10 CFR 20.2003, and**

This information is provided in Section 11.3.4 of the C-T Phase II Decommissioning Plan.

**e. A summary of the estimates of doses to the public from effluents and a description of the method used to estimate public dose.**

This information is provided in Section 11.3.5 of the C-T Phase II Decommissioning Plan.

**STANDARD REVIEW PLAN CHECKLIST  
C-T PHASE II DECOMMISSIONING PLAN**

**12.0 RADIOACTIVE WASTE MANAGEMENT PROGRAM**

**12.1. SOLID RADIOACTIVE WASTE**

- a. A summary of the types of solid radioactive waste that are expected to be generated during decommissioning operations, including (but not limited to) soil, structural and component metal, concrete, activated components, contaminated piping, wood, and plastic;  
Section 12.1.1, paragraph 1.
- b. A summary of the estimated volume, in cubic feet, of each solid radioactive waste type summarized under bullet 1, above;  
Section 12.1.1, paragraph 2 and Table 12-1.
- c. A summary of radionuclides (including the estimated activity of each radionuclide) in each estimated solid radioactive waste type summarized under bullet 1, above;  
Section 12.1.1, paragraph 2 and Table 12-2.
- d. A summary of the volumes of Classes A, B, C, and greater-than-Class-C solid radioactive waste that will be generated by decommissioning operations;  
Section 12.1.1, paragraph 3 and Table 12-1.
- e. A description of how and where each of the solid radioactive wastes summarized under bullet 1, above, will be stored on-site prior to shipment for disposal;  
Section 12.1.3
- f. A description of how each of the solid radioactive wastes summarized under bullet 1 above, will be treated and packaged to meet disposal site acceptance criteria prior to shipment for disposal;  
Section 12.1.3, paragraph 5.
- g. If appropriate, how the licensee or responsible party intends to manage volumetrically contaminated material;  
Section 12.1.1, paragraph 1 and Section 12.1.2.
- h. A description of how the licensee or responsible party will prevent contaminated soil, or other loose solid radioactive waste, from being re-distributed after exhumation and collection; and  
Section 12.1.2, paragraph 1 and Section 12.1.3, paragraph 3.

## STANDARD REVIEW PLAN CHECKLIST C-T PHASE II DECOMMISSIONING PLAN

- i. The name and location of the disposal facility that the licensee intends to use for each solid radioactive waste type summarized under bullet 1 above.

Section 12.1.5. WCS Texas, USEcology Idaho, and Envirocare Utah are candidate facilities for wastes containing unimportant source material concentration per 10 CFR Part 40.13. Envirocare is a candidate facility for wastes containing greater than unimportant source material concentration.

### 12.2. LIQUID RADIOACTIVE WASTE

- a. A summary of the types of liquid radioactive waste that are expected to be generated during decommissioning operations;

Section 12.2, paragraphs 1, 2, 3.

- b. A summary of the estimated volume, in liters, of each liquid radioactive waste type summarized under bullet 1 above;

Section 12.2, paragraph 4

- c. A summary of the radionuclides (including the estimated activity of each radionuclide) in each liquid radioactive waste type summarized under bullet 1 above;

Section 12.2, paragraph 2.

- d. A summary of the estimated volumes of Class A, B, C, and Greater-than-Class-C liquid radioactive waste that will be generated by decommissioning operations;

Section 12.2, paragraph 4

- e. A description of how and where each of the liquid radioactive wastes summarized under bullet 1 above, will be stored on-site prior to shipment for disposal;

Section 12.2, paragraph 2.

- f. A description of how each of the liquid radioactive wastes summarized under bullet 1 above, will be treated and packaged to meet disposal site acceptance criteria prior to shipment for disposal; and

Section 12.2, paragraph 2.

- g. The name and location of the disposal facility that the licensee intends to use for each liquid radioactive waste type summarized under bullet 1, above.

Section 12.2, paragraph 2.

### 12.3. MIXED WASTE

- a. A summary of the types of solid and liquid mixed waste that are expected to be generated during decommissioning operations;

## **STANDARD REVIEW PLAN CHECKLIST C-T PHASE II DECOMMISSIONING PLAN**

Section 12.3, paragraph 1.

- b. A summary of the estimated volumes, in cubic feet, of each solid mixed waste type summarized under bullet 1 above and in liters for each liquid mixed waste;

Section 12.3, paragraph 1.

- c. A summary of the radionuclides (including the estimated activity of each radionuclide) in each type of mixed waste type summarized under bullet 1 above;

Section 12.3, paragraph 1.

- d. A summary of the estimated volumes of Class A, B, C and Greater-than-Class-C mixed waste that will be generated by decommissioning operations;

Section 12.3, paragraph 1.

- e. A description of how and where each of the mixed wastes summarized under bullet 1 above, will be stored on-site prior to shipment for disposal;

Section 12.3, paragraphs 1, 2, 3.

- f. A description of how the each [sic] of the mixed wastes summarized under bullet 1 above, will be treated and packaged to meet disposal site acceptance criteria prior to shipment for disposal;

Section 12.3, paragraph 1.

- g. The name and location of the disposal facility that the licensee intends to use for each mixed waste type summarized under bullet 1 above;

Section 12.3, paragraph 1.

- h. A discussion of the requirements of all other regulatory agencies having jurisdiction over the mixed waste; and

Section 12.3, paragraph 1.

- i. A demonstration that the licensee possesses the appropriate EPA or State permits to generate, store and/or treat the mixed wastes.

Section 12.3, paragraph 1.

# STANDARD REVIEW PLAN CHECKLIST C-T PHASE II DECOMMISSIONING PLAN

## 13.0 QUALITY ASSURANCE PROGRAM

### 13.1. ORGANIZATION

- a. A description of the QA program management organization;  
This information is provided in Section 13.1.1 and in Section 9.1.
- b. A description of the duties and responsibilities of each unit within the organization and how delegation of responsibilities is managed within the decommissioning program;  
This information is provided in Section 13.1.2 and in Sections 9.1.2 through 9.1.8.
- c. A description of how work performance is evaluated;  
This information is provided in Section 13.1.3.
- d. A description of the authority of each unit within the QA program; and  
This information is provided in Section 13.1.2.
- e. An organization chart of the QA program organization.  
This information is included in Figure 9-1.

### 13.2. QUALITY ASSURANCE PROGRAM

- a. A commitment that activities affecting the quality of site decommissioning will be subject to the applicable controls of the QA program and activities covered by the QA program are identified on program defining documents;  
Adequate information is included in Sections 13.2.1 and 13.2.2.
- b. A brief summary of the company's QA policies;  
Information is provided in Section 13.2.2.
- c. A description of provisions to ensure that technical and quality assurance procedures required to implement the QA program are consistent with regulatory, licensing, and QA program requirements and are properly documented and controlled;  
Adequate information is provided in sections 13.2.2 through 13.2.5.
- d. A description of the management reviews, including the documentation of concurrence in these quality-affecting procedures;  
This information is provided in Section 13.2.4.
- e. A description of the quality-affecting procedural controls of the principal contractors, including documentation of the acceptance of the controls before the initiation of activities affected by the program;  
This information is provided in Sections 13.2.3 and 13.2.5.

## **STANDARD REVIEW PLAN CHECKLIST C-T PHASE II DECOMMISSIONING PLAN**

- f. A description of how NRC will be notified of changes (a) for review and acceptance in the accepted description of the QA program as presented or referenced in the decommissioning plan before implementation and (b) in organizational elements within 30 days after the announcement of the changes (Note: Editorial changes or personnel reassignments of a nonsubstantive nature do not require NRC notification);

This information is provided in Sections 13.2.5, 9.5, and 9.6.

- g. A description is provided of how management (above or outside the QA organization) regularly assesses the scope, status, adequacy, and compliance of the QA program;

This information is provided in Section 13.2.6.

- h. A description of the instruction provided to personnel responsible for performing activities affecting quality pertaining to the purpose, scope, and implementation of the quality-related manuals, instructions, and procedures;

This information is provided in Sections 9.4.1 and 9.4.4.

- i. A description of the training and qualifications of personnel verifying activities affecting quality in the principles, techniques, and requirements of the activity being performed;

This information is provided in Section 9.4.4.

- j. For formal training and qualification programs, documentation includes the objectives and content of the program, attendees, and date of attendance;

This information is provided in Sections 9.4.4.4.

- k. A description of the self-assessment program to confirm that activities affecting quality comply with the QA program;

This information is provided in Section 13.2.7.

- l. A commitment that persons performing self-assessment activities are not to have direct responsibilities in the area they are assessing;

This information is provided in Sections 13.2.8 and 13.2.9.

- m. A description of the organizational responsibilities for ensuring that activities affecting quality are (a) prescribed by documented instructions, procedures, and drawings; and (b) accomplished through implementation of these documents; and

This information is provided in Sections 13.1.1, 13.1.2, and 13.2.8 and 9.2 .

- n. A description of the procedures to ensure that instructions, procedures, and drawings include quantitative acceptance criteria (such as those pertaining to dimensions, tolerances, and operating limits) and qualitative acceptance criteria (such as workmanship samples) for determining that important activities have been satisfactorily performed.

This information is provided in Sections 9.2, 13.2.3, 13.2.4, 13.2.6, 13.2.7, and 13.2.10.

## **STANDARD REVIEW PLAN CHECKLIST C-T PHASE II DECOMMISSIONING PLAN**

### **13.3. Document Control**

- a. A summary of the types of QA documents that are included in the program; and  
This information is provided in Sections 9.2 and 13.3.1.
- b. A description of how the licensee or responsible party develops, issues, revises and retires QA documents.  
This information is provided in Sections 9.2 and 13.3.2.

### **13.4. Control of Measuring and Test Equipment**

- a. A summary of the test and measurement equipment used in the program;  
This information is provided in Section 13.4. Sections 4 and 14 provide lists of typical test and measurement equipment employed in health physics and in remediation or final status surveys respectively.
- b. A description of how and at what frequency the equipment will be calibrated;  
This information is provided in Section 13.4.
- c. A description of the daily calibration checks that will be performed on each piece of test or measurement equipment; and  
This Information is provided in Section 13.4.
- d. A description of the documentation that will be maintained to demonstrate that only properly calibrated and maintained equipment was used during the decommissioning.  
This Information is provided in Section 13.4.

### **13.5. Corrective Action**

- a. A description of the corrective action procedures for the facility, including a description of how the corrective action is determined to be adequate; and  
This information is provided in Section 13.5.1.
- b. A description of the documentation maintained for each corrective action and any follow-up activities by the QA organization, after the corrective action is implemented.  
This information is provided in Section 13.5.2.

### **13.6. Quality Assurance Records**

- a. A description of the manner in which QA records will be managed;  
This information is provided in Section 13.6.1.
- b. A description of the responsibilities of the QA organization as well as all other units involved in the decommissioning to implement and maintain QA records; and  
This information is provided in Section 13.1.

## **STANDARD REVIEW PLAN CHECKLIST C-T PHASE II DECOMMISSIONING PLAN**

- c. A description of the QA records storage facility.

This information is not provided in the Phase II Plan.

### 13.7. Audits and Surveillances

- a. A description of the audit program, including the procedures for conducting the audits or surveillances;

This information is provided in Section 13.7.

- b. A description of the records and documentation generated during the audits and the manner in which the documents are managed;

This information is provided in Section 13.7.

- c. A description of all follow-up activities associated with audits or surveillances;

Adequate information is implied in the Phase II Plan.

- d. A description of the trending/tracking that will be performed on the results of audits and surveillances.

This information is provided in Section 13.7.

# STANDARD REVIEW PLAN CHECKLIST C-T PHASE II DECOMMISSIONING PLAN

## 14.0 FACILITY RADIATION SURVEYS

### 14.1. RELEASE CRITERIA

Section 14.1 refers to DCGL and area factor values developed and tabulated in Section 5 of the Phase II Plan, but does not reproduce them.

- a. **A summary table or list of the  $DCGL_W$  for each radionuclide and impacted medium of concern;**

Section 14.1 refers to values developed and tabulated in Section 5 of the Phase II Plan.

- b. **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;**

Section 14.1 refers to values developed and tabulated in Section 5 of the Phase II Plan.

- c. **If Class 1 survey units are present, the  $DCGL_{EMCs}$  for each radionuclide and medium of concern;**

Section 14.1 describes the  $DCGL_W$  and area factors and refers to Section 5, where values are developed and tabulated. Section 14.1 notes that values for  $DCGL_W$  and area factors are used to calculate  $DCGL_{EMC}$ , and refers to Sections 5, 14.4.3.5, and 14.4.3.8, which describe the calculation and utilization of  $DCGL_{EMC}$ .

- d. **If multiple radionuclides are present, the appropriate  $DCGL_W$  for the survey method to be used.**

Section 14.1 refers to values developed and tabulated in Section 5 of the Phase II Plan. Sections 5.8.1, 5.8.3.2, and 14.4.1 refer to a conventional method of compositing multiple radionuclides by a sum-of-fractions equation.

### 14.2. CHARACTERIZATION SURVEYS

Section 14.2 briefly describes the Characterization Survey (conducted in accordance with NRC-approved plan), refers to the Radiological Status summary in Section 4 of the Phase II Plan, references the Characterization Survey report and identifies how Characterization Survey data may be used in the Final Status Survey. Some checklist items in this section are addressed in other sections of the Phase II Plan, as indicated below.

- a. **A description and justification of the survey measurements for impacted media (for example, building surfaces, building volumetric, surface soils, subsurface soils, surface water, groundwater, sediments, etc., as appropriate);**

## STANDARD REVIEW PLAN CHECKLIST C-T PHASE II DECOMMISSIONING PLAN

Section 14.2 refers to Section 4 of the Phase II Plan and the Characterization Survey Report.

- b. Description of the field instruments and methods that were used for measuring concentrations and the sensitivities of those instruments and methods;**

Section 14.2 refers to Section 4 of the Phase II Plan and the Characterization Survey Report. Instruments and methods for Characterization Survey measurements that may be used in the FSS are included in tables of instruments and methods in Section 14.4.1.

- c. A description of the laboratory instruments and methods that were used for measuring concentrations and the sensitivities of those instruments and methods;**

Section 14.2 refers to Section 4 of the Phase II Plan and the Characterization Survey Report. Instruments and methods for Characterization Survey measurements that may be used in the FSS are included in tables of instruments and methods in Section 14.4.1.

- d. The survey results including tables or charts of the concentrations of residual radioactivity measured;**

Section 14.2 refers to summary information in Section 4 of the Phase II Plan and detailed information in the Characterization Survey Report.

- e. Maps or drawings of the site, area, or building showing areas classified as non-impacted or impacted and visually summarizing residual radioactivity concentrations in impacted areas;**

Section 14.2 refers to summary information in Section 4 of the Phase II Plan and detailed information in the Characterization Survey Report.

- f. The justification for considering areas to be non-impacted;**

Bases for determining non-impacted areas are discussed in Section 14.4.3.1 of the Phase II Plan.

- g. A discussion of why the licensee considers the characterization survey to be adequate to demonstrate that it is unlikely that significant quantities of residual radioactivity have gone undetected;**

Section 14.2 refers to summary information in Section 4 of the Phase II Plan and detailed information in the Characterization Survey Report. Delineation of the nature and extent of licensed radioactive material distribution on the site was the primary goal of the Characterization Survey and the NRC-approved plan to implement it.

- h. For areas and surfaces that are inaccessible or not readily accessible, a discussion of how they were surveyed or why they did not need to be surveyed;**

## STANDARD REVIEW PLAN CHECKLIST C-T PHASE II DECOMMISSIONING PLAN

Refer to C-T Phase II Plan, Section 8. On the basis of the characterization survey, a radioactively contaminated medium that is inaccessible is not expected.

- i. **For sites, areas, or buildings with multiple radionuclides, a discussion of justifying the ratios of radionuclides that will be assumed in the final status survey or an indication that no fixed ratio exists and each radionuclide will be measured separately (note that this information may be developed and refined during decommissioning and licensees may elect to include a plan to develop and justify final radionuclide ratios in the decommissioning plan).**

Addressed in Appendix C.

### 14.3. REMEDIAL ACTION SUPPORT SURVEYS

- a. **A description of the field screening methods and instrumentation.**

Information provided in Section 14.3 of the Phase II Plan.

- b. **A demonstration that field screening should be capable of detecting residual radioactivity at the DCGL.**

Information provided in Section 14.3 of the Phase II Plan.

### 14.4. FINAL STATUS SURVEY DESIGN

- a. **A brief overview describing the final status survey design.**

An overview is provided in the Section 14.4 of the Phase II Plan.

- b. **A description and map or drawing of impacted areas of the site, area, or building classified by residual radioactivity levels (Class 1, Class 2, Class 3) and divided into survey units, with an explanation of the basis for division into survey units. Maps should have compass headings indicated.**

Rules for area classification are provided in Section 14.4 of the Phase II Plan. Maps in Figures 4-18, 4-19, 4-20, and 14-2 display subsoil locations estimated to contain more and less than the  $DCGL_w$  in soil. Figures 14-1A, 14-1B portray classification of pavement and slabs. Figure 14-2 portrays classification of subsurface soil.

- c. **A description of the background reference areas and materials, if they will be used, and a justification for their selection.**

Information is provided in the Section 14.4.2 of the Phase II Plan and is referenced in Appendix B addressing background in subsurface materials. Background is also discussed in Section 4 of the Phase II Plan and in the Characterization Survey Report that is referenced in Section 14.2 of the Phase II Plan.

## STANDARD REVIEW PLAN CHECKLIST C-T PHASE II DECOMMISSIONING PLAN

- d. **A summary of the statistical tests that will be used to evaluate the survey results, including the elevated measurement comparison, if Class 1 survey units are present, a justification for any test methods not included in MARSSIM, and the values for the decision errors ( $\alpha$  and  $\beta$ ) with a justification for  $\alpha$  greater than 0.05.**

Information is provided in Sections 14.4.3 and 14.4.3.8 of the Phase II Plan.

- e. **A description of scanning instruments, methods, calibration, operational checks, coverage, and sensitivity for each media and radionuclide.**

Information is provided in Sections 10.1.7 and 14.4.1 of the Phase II Plan.

- f. **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.**

In situ measurement of subsurface material is described in Section 14.4.1 and Appendix E of the Phase II Plan and a referenced appendix

- g. **A description of the analytical instruments for measuring samples in the laboratory, including the calibration, sensitivity, and methodology for evaluation, with a demonstration that the instruments and methods have adequate sensitivity.**

Laboratory measurement of subsurface material is described in Section 14.4.1 of the Phase II Plan.

- h. **A description of how the samples to be analyzed in the laboratory will be collected, controlled, and handled.**

Addressed to the extent appropriate in Phase II Plan, Section 13 *Quality Assurance Program* and in Section 14.4.4.

- i. **A description of the final status survey investigation levels and how they were determined.**

Information is provided in the Section 14.4.3.8 of the Phase II Plan.

- j. **A summary of any significant additional residual radioactivity that was not accounted for during site characterization.**

Not applicable—no such radioactivity known.

- k. **A summary of direct measurement results and/or soil concentration levels in units that are comparable to the DCGL and if data is used to estimate or update the survey unit.**

To be provided in Final Status Survey Report, as described in Section 14.5 of the Phase II Plan.

## **STANDARD REVIEW PLAN CHECKLIST C-T PHASE II DECOMMISSIONING PLAN**

- 1. A summary of the direct measurements or sample data used to both evaluate the success of remediation and to estimate the survey unit variance.**

To be provided in Final Status Survey Report, as described in Section 14.5 of the Phase II Plan.

### **14.5. FINAL STATUS SURVEY REPORT**

- a. An overview of the results of the final status survey.**  
Specification of incorporation of this item in the Final Status Survey Report is provided in Section 14.5 of the Phase II Plan.
- b. A discussion of any changes that were made in the final survey from what was proposed in the Decommissioning Plan or other prior submittals.**  
Specification of incorporation of this item in the Final Status Survey Report is provided in Section 14.5 of the Phase II Plan.
- c. A description of the method by which the number of samples was determined for each survey unit.**  
Specification of incorporation of this item in the Final Status Survey Report is provided in Section 14.5 of the Phase II Plan.
- d. A summary of the values used to determine the numbers of sample and a justification for these values.**  
Specification of incorporation of this item in the Final Status Survey Report is provided in Section 14.5 of the Phase II Plan.
- e. The survey results for each survey unit including:**
- i. The number of samples taken for the survey unit.**  
Specification of incorporation of this item in the Final Status Survey Report is provided in Section 14.5 of the Phase II Plan.
  - ii. A map or drawing of the survey unit showing the reference system and random start systematic sample locations for Class 1 and 2 survey units, and random locations shown for Class 3 survey units and reference areas.**  
Specification of incorporation of this item in the Final Status Survey Report is provided in Section 14.5 of the Phase II Plan.
  - iii. The measured sample concentrations.**

## STANDARD REVIEW PLAN CHECKLIST C-T PHASE II DECOMMISSIONING PLAN

Specification of incorporation of this item in the Final Status Survey Report is provided in Section 14.5 of the Phase II Plan.

**iv. The statistical evaluation of the measured concentrations.**

Specification of incorporation of this item in the Final Status Survey Report is provided in Section 14.5 of the Phase II Plan.

**v. Judgmental and miscellaneous sample data sets reported separately from those samples collected for performing the statistical evaluation.**

Specification of incorporation of this item in the Final Status Survey Report is provided in Section 14.5 of the Phase II Plan.

**vi. A discussion of anomalous data including any areas of elevated direct radiation detected during scanning that exceeded the investigation level or measurement locations in excess of DCGL<sub>w</sub>.**

Specification of incorporation of this item in the Final Status Survey Report is provided in Section 14.5 of the Phase II Plan.

**vii. A statement that a given survey unit satisfied the DCGL<sub>w</sub> and the elevated measurement comparison if any sample points exceeded the DCGL<sub>w</sub>.**

Specification of incorporation of this item in the Final Status Survey Report is provided in Section 14.5 of the Phase II Plan.

**f. A description of any changes in initial survey unit assumptions relative to the extent of residual radioactivity.**

Specification of incorporation of this item in the Final Status Survey Report is provided in Section 14.5 of the Phase II Plan.

**g. If a survey unit fails, a description of the investigation conducted to ascertain the reason for the failure and a discussion of the impact that the failure has on the conclusion that the facility is ready for final radiological surveys.**

Specification of incorporation of this item in the Final Status Survey Report is provided in Section 14.5 of the Phase II Plan.

**h. If a survey unit fails, a discussion of the impact that the reason for the failure has on the other survey unit information.**

Specification of incorporation of this item in the Final Status Survey Report is provided in Section 14.5 of the Phase II Plan.

## STANDARD REVIEW PLAN CHECKLIST C-T PHASE II DECOMMISSIONING PLAN

### 15.0 DECOMMISSIONING FINANCIAL ASSURANCE

There is an existing Financial Assurance Plan which was revised on January 11, 2002 which was prepared to be consistent with and meets all of the requirements listed in the checklists below. The NRC has an original signed copy of this plan.

#### **Checklist 1 Master Checklist for Decommissioning Financial Assurance**

**Type of Submission:** Decommissioning Funding Plan (See Checklist 3 below)

**Type of Mechanism:** Letter of credit (See Checklist 10-A below)

#### **Checklist 3 Decommissioning Funding Plans**

- Prepare a detailed, site-specific cost estimate.
- Determine the means that will be used to adjust the site-specific cost estimate and associated funding levels periodically over the life of the facility.
- Include the necessary documentation.
- Include a detailed, site-specific cost estimate that includes the following:
  - Description of the means that will be used to adjust the site-specific cost estimate and associated funding level.
  - A certification that financial assurance for decommissioning has been provided in the amount of the decommissioning cost estimate.
- Include a financial instrument and supporting documentation.

#### **Checklist 10-A Letters of Credit**

- Documentation is complete when the following are included:
  - 1. Letter of credit (originally signed duplicate) contains contact information for financial institution and NRC license and docket numbers,
  - 2. standby trust agreement and all supporting documentation ( See Checklist 17-A below),
  - 3. Checklist 10-B ( if model letter of credit wording is modified or not used).
- The financial institution is regulated by a Federal or State agency.
- The amount of the letter of credit equals or exceeds the required coverage level.

#### **Checklist 17-A Standby Trust Funds**

- Documentation is complete when the following are included:
  - 1. Standby trust agreement (originally signed duplicate),
  - 2. Schedule A,
  - 3. Schedule B,
  - 4. Schedule C,
  - 5. Specimen certificate of events,
  - 6. Specimen certificate of resolution.
  - 7. Letter of acknowledgement, and
  - 7. Checklist 17-B (if model standby trust wording is modified or not used).
- The trust is qualified when the following conditions are true:
  - The financial institution is regulated by a Federal or State agency.

**STANDARD REVIEW PLAN CHECKLIST  
C-T PHASE II DECOMMISSIONING PLAN**

- The financial institution has authority to act as a trustee and has trust operations that are regulated and examined by a Federal or State agency.**

**MALLINCKRODT C-T  
DECOMMISSIONING PROJECT**

**Official Project Documents**

**DRAFT  
C-T Phase II Decommissioning Plan  
May 15, 2003**

**NRC Docket : 40-06563  
NRC License: STB-401**

**Controlled Copy Number 3**

**Issued to: Jean-Claude Dehmel - NRC**