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CONCEPTUAL DECOMMISSIONING COST ESTIMATES FOR 26 ORNL SURPLUS CONTAMINATED FACILITIES

VOLUME I

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PREPARED BY

ADVANCED SCIENCES, INC.
OAK RIDGE, TENNESSEE

ORNL/RAP-30

CONCEPTUAL DECOMMISSIONING COST ESTIMATES FOR 26 ORNL CONTAMINATED FACILITIES

VOLUME I

Prepared for the
Assistant Secretary for Energy Research

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Prepared by

ADVANCED SCIENCES, INC. (ASI)
107-F Jefferson Avenue
Oak Ridge, Tennessee 37830

Oak Ridge National Laboratory
Oak Ridge, Tennessee 37831
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PREFACE

This two volume report contains conceptual decommissioning cost estimates for 26 surplus contaminated facilities at the Oak Ridge National Laboratory (ORNL). The work was commissioned by the ORNL's Remedial Action Program (RAP) to provide order-of-magnitude cost estimates for decontamination and decommissioning of facilities included in their Surplus Contaminated Facilities Program. These data are to be integrated with their existing program documentation for use as an initial planning base for long-term program management. The results of this effort are reported in two volumes as described below.

Volume I - Development of Decommissioning Alternatives

This volume contains brief site descriptions for the 26 facilities, and decommissioning alternatives considered appropriate for each site. The lists of alternatives were developed from existing facility information, site inspections, personnel interviews, and evaluations of current decommissioning technologies. The specific alternatives are described in summary fashion as applicable to a particular facility. The order of alternatives as listed does not imply preference on any basis.

After compiling the lists of viable alternatives, Volume I was presented to the ORNL RAP staff for their consideration and selection of alternatives for cost estimation. Selection criteria were developed by the ORNL staff and were based on three key principles:

(1) facilities in the ORNL main plant area which contained subterranean components or resulted in past soil contamination, were not to be exhumed; i.e., in-situ contamination stabilization was generally selected;

(2) facilities outside the main plant area in remote locations which contained subterranean components or resulted in past soil contamination were totally dismantled and removed including contaminated soil removal; and

(3) decommissioning methods for above-ground facilities, laboratories, hot cells, etc. generally involved total dismantlement and removal to provide the most conservative approach for planning purposes.

Volume II - Development of Decommissioning Cost Estimates

The decommissioning alternatives selected by the ORNL staff were further developed into conceptual decommissioning cost and schedule estimates contained in Volume II. The selected alternatives do not imply endorsement by Advanced Sciences, Inc. or by the ORNL RAP staff; but rather represent the alternatives currently viewed as most viable for particular facilities in their respective locations. The cost estimates were developed based on the limited information and site characterization data available. In nearly all cases, data were not sufficient to provide precise conceptual estimates and many assumptions were made to enable completion of the estimates. Of particular note is the lack of data concerning the presence of long-term alpha emitters which if present in sufficient quantities, could preclude implementation of a selected alternative. In addition, data were generally lacking on the presence of Resource Conservation and Recovery Act (RCRA) hazardous chemical waste. The presence of significant quantities of hazardous waste or mixed waste could substantially impact the costs of decommissioning. The rates for waste disposal used in the estimation process were provided by ORNL, and represent expected costs in FY 1992. These rates like others used in the estimates are subject to change. The scope of site characterization and project management in these estimates is based on similar projects and remedial actions underway at ORNL under Department of Energy programs, which are influenced by state and federal environmental regulations. The scope of these project elements could be significantly affected in the future.

SECTION I

INTRODUCTION

Throughout its history, the Oak Ridge National Laboratory (ORNL) has conducted numerous activities and studies involving radioactive and hazardous materials. As a result of these actions, portions of the ORNL complex have become contaminated. When the facilities reach the end of their useful life, decommissioning options must be addressed.

Advanced Sciences, Inc. has been contracted to examine 26 of these surplus contaminated facilities and to develop appropriate decommissioning alternatives and conceptual cost estimates. This report describes the decommissioning alternatives for each facility, and the conceptual cost estimates.

After reviewing the list of the 26 facilities and holding interviews and discussions with ORNL personnel, many decommissioning alternatives were identified for each facility. These alternatives were screened considering the limited characterization data available and information gained from facility inspections. These screened alternatives considered to be most practical are presented here and were submitted to ORNL for selection of the preferred alternative(s) for conceptual cost and schedule estimates.

For each decommissioning alternative selected by ORNL, a description of the technical approach was prepared to assist in the development of the cost estimates. The technical approach and associated cost is based on the engineering assessment of available data. Where data gaps are encountered, assumptions to support sound engineering assessments were made and are described.

Existing data sometimes do not completely identify or quantify contaminants and contaminated materials. At some sites accurate data reflecting these factors are essential for precise estimates of decommissioning alternatives

and associated costs. In the absence of such data, best engineering judgment was used to provide conceptual cost estimates. Cost information provided by ORNL was supplemented as necessary to develop the decommissioning costs. The resulting cost estimates and associated schedule of activities for each of the decommissioning alternatives is presented in Volume II of this report.

SECTION II

FACILITIES AND ALTERNATIVES

This section contains facility descriptions and lists of decommissioning alternatives for each facility. Facility descriptions were compiled from the Environmental Protection Agency (EPA) data sheets contained in the RCRA Facility Assessment - ORNL, facility inspections, Maintenance and Surveillance Plan, Scoping Survey, and interviews with ORNL personnel.

Following the description of each facility, a list of decommissioning alternatives considered by ASI to be applicable and technically feasible, is compiled. No detailed interpretations or evaluation of environmental effects is attempted at this time. Alternatives are listed which ASI deems appropriate for the expected conditions.

Since none of the 26 facilities considered in the report appears to pose an imminent threat, the normally recognized decommissioning alternative of "No Action" applies to each one. This alternative consists of taking no action beyond current monitoring, surveillance and maintenance activities. It should be remembered when reading the various alternatives presented for each facility, that this alternative is also implied.

All alternatives, other than "No Action", include post decontamination and decommissioning (D&D) characterization. This is deemed necessary for the site closure report which would be submitted to the Department of Energy (DOE) as the final step in decommissioning. Pre-D&D characterization is dependent upon the site contamination levels and the amount of data already available.

1.1 Oil Storage Tank (Tank 7860A)

This facility consists of an inactive underground oil storage tank, located at the New Hydrofracture Facility (NHF) in Melton Valley at ORNL. The tank was used between 1981 and 1985 to hold various contaminated waste oils from the hydrofracture facility. Use of the tank was discontinued in 1985 when the hydrofracture operations ceased.

The 4,500 gal mild steel tank rests on a concrete pad, with three pipes extending to the surface. The entire structure is below grade.

The tank is reportedly full of a mixture of oils and water (presumably stratified), containing an estimated radionuclide inventory of 20 mCi (5uCi/gal). No data exists as to the specific types and quantities of radionuclides, or the hazardous chemicals. Sampling plans are currently being developed to characterize the tank contents.

The tank is reported to be structurally sound, with no apparent leaks. A radiological survey of the adjacent soil surface indicated no activity which would have resulted from past spills.

1.2 Decommissioning Alternatives

The following decommissioning alternatives have been identified for this facility, and are described below:

a. Decontamination
b. Total Dismantlement and Disposal
c. Entombment

a. <u>Decontamination</u>. This alternative involves removing the waste oil from the tank, and decontaminating the inside of the tank. The waste oil would be pumped from the tank into appropriate liquid waste containers for disposal, treatment, or incineration.

The tank interior would be decontaminated with remotely operated robotic equipment using water or other chemical reagents (such as organic solvents) through high pressure liquid jets. Hot spots or hard deposits may require the use of abrasive jet scarification. This alternative will produce significant volumes of contaminated water or solvents that must be treated prior to disposal. After decontamination, the tank would be abandoned in place. All inlet lines to the tank would be sealed to prevent leakage into the tank.

b. Total Dismantlement and Disposal. This alternative involves removing the waste oil as described in alternative a. The surface soil surrounding the tank would be excavated, and all connecting pipes disconnected. The exposed pipe ends would be sealed. The tank would be segmented for removal and disposal. The tank segments, and any excavated soil would be disposed of in an appropriate waste disposal facility.

c. Entombment. This alternative involves removing the waste oil as described in alternative a. The surface soil surrounding the tank would be excavated, and all connecting pipes disconnected. The exposed pipe ends would be sealed. The excavated soil would be disposed of in an appropriate waste disposal facility. The tank would then be entombed with grout, and a permanent cap, with appropriate placard, would be placed over the tank.

2.1 FPDL LLW Transfer Line (3517)

This facility consists of an underground stainless steel pipe contaminated with Sr-90 and Cs-137. The line was used for transferring waste from the Fission Product Development Laboratory (FPDL) for handling and disposal. The line has been removed from service and replaced by a doubly-contained system. Nitric acid has been transferred through the line but is not present in significant quantities. There is no evidence of leakage from the LLW line.

2.2 Decommissioning Alternatives

The following decommissioning alternatives have been identified for this facility, and are described below:

a. Decontamination
b. Entombment
c. Excavation

a. Decontamination. This alternative involves excavation at each end of the transfer line. The line would be severed and decontaminated while in place. Then the ends would be capped and the soil backfilled to cover the line.

b. Entombment. This alternative involves excavation at each end of the line to gain access to the transfer line. The pipe would be filled with foam or concrete to fix the contamination and then left in place. Soil would be backfilled to cover the line. Detailed characterization would be required prior to entombing the line.

c. Excavation. This alternative involves excavating the length of line which has been replaced by the new line, segmenting and sealing the line in sections of appropriate length for disposal, and backfilling the excavation.

3.1 FPDL Filter Pit (3517)

Located east of Building 3517, this facility consists of a concrete pit containing banks of fiber roughing filters. In the 1960s, the roughing filters were replaced with stainless steel back-washable filters, which were in turn replaced with High Efficiency Particulate Air (HEPA) finishing filters. Operations began in 1958, an upgrade was completed in 1986 and the filter pit is still in use. Present levels of radiation at the filters measure approximately 200 R/h. The main radionuclides are Cs-137 and Sr-90.

The stainless steel roughing filters were acid backwashed, and the leakage from this operation has contaminated the filter pit. Recent excavation at the site resulted in the removal of large quantities of contaminated soil, with the maximum levels of 10 R/h recorded at contact. An undetermined amount of contaminated soil remains.

3.2 Decommissioning Alternatives

Because this facility consists of both contaminated soil and concrete, the decommissioning alternatives for these items are addressed separately below.

3.2.1 Soil

The following decommissioning alternatives have been identified for the soil area, and are described below:

a. Protective Storage
b. Entombment
c. Excavation

a. <u>Protective Storage</u>. This alternative involves placing the area into protective storage by fencing the area to minimize human intrusion, and providing appropriate warning signs to indicate the hazards within the fenced area. Appropriate entrance procedures would be required, such as requiring

protective clothing, should access to the area be required. Routine monitoring of the area would be conducted to detect migration of contamination from the facility.

b. Entombment. This alternative involves encasement of the contaminated soil by pressure injection of polyacrilamide grout throughout and around the contaminated soil. After grouting the contaminated area would be protected by applying a surface cover, consisting of clay, soil, asphalt, or concrete. A layer of soil may be placed over the clay, asphalt, or concrete protective covers for aesthetic reasons.

c. Excavation. This alternative involves excavating the contaminated soils for treatment or disposal in an approved waste disposal facility. Conventional excavation equipment and techniques would be used. The excavation would be backfilled with clean soil.

3.2.2. Concrete

The following decommissioning alternatives have been identified for the concrete portion of this facility, and are described below:

a. Protective Storage
b. Cover
c. Excavation
d. Decontamination
e. Entombment

a. Protective Storage. This would be the same as 3.2.1a above.

b. Cover. This alternative involves pouring an additional layer of concrete over the pad or painting the surface with a fixative.

c. Excavation. This alternative involves the excavation and demolition of the concrete and disposal in an approved waste disposal facility. The excavation would be backfilled with clean fill.

d. Decontamination. This alternative involves decontaminating the contaminated surfaces of concrete using appropriate methods for porous materials.

e. Entombment. This alternative involves detailed characterization to document the contamination entombed, and filling the pit and other voids with concrete, and covering or grouting other contaminated surfaces.

4.1 LLW Tank W-1A (Site 3023)

This facility consists of an inactive low level waste (LLW) collection and stabilization tank located in the North Tank Farm (NTF) of the ORNL main plant area. The tank received wastes from the High Radiation Level Analytical Facility (Buildings 2026 and 3019-B), and the Radiochemical Processing Plant (Building 3019-A).

The 4,000 gal stainless steel tank is reported to be in good condition by the Operations Division despite the use of harsh acidic solutions during its operation. Recent surveillance records have indicated inleakage of ground water into the tank, reported to be the result of poor integrity of the upstream lines.

Tank radiation levels have not been measured, but are estimated to be in excess of 100 R/h (10^6 dpm/100 cm^2). Based on process knowledge, it is estimated that the tank contains curie quantities of fission products, and lesser quantities of transuranic materials. Sampling plans are currently being developed to characterize the tank contents. No apparent external contamination exists as a result of the tank leakage. Background radiation levels are reported to be less than 3 mR/h at the ground surface.

4.2 Decommissioning Alternatives

The following decommissioning alternatives have been identified for this facility, and are described below:

a. Decontamination
b. Partial Dismantlement and Entombment

a. <u>Decontamination</u>. This alternative involves removing the liquid waste from the tank, and decontaminating the inside of the tank. The liquid waste would be disposed of through the existing LLW lines for appropriate waste treatment. Treatment requirements are dependent upon the waste characterization results.

The tank interior would be decontaminated with remotely operated equipment. Hot spots or hard deposits would require the use of abrasive scarification techniques. This alternative would produce some contaminated water and would require treatment prior to disposal. After decontamination, the tank would be left in place. All inlet lines to the tank would be sealed to prevent inleakage into the tank.

b. Partial Dismantlement and Entombment. This alternative involves removing the liquid wastes as described in alternative a. All connecting pipes would be disconnected and removed. The exposed pipe ends would be sealed. The tank would be entombed with grout. Detailed tank characterization would be required prior to entombment.

5.1 Decontamination Facility (7819)

This facility consists of a Butler building, equipment, and the land area within a 50-foot radius of the building. The building was used to decontaminate such items as isotope carriers from laboratories and hot cells by means of acid baths and sand blasting. The radiation exposure (beta and gamma) ranges from a maximum of 3.5 R/h (equipment and shelves) in the C zone to < 10 mR/h at floor level in the clean area. There are no reported releases, although contamination is present outside the building. The amount of contaminated soil is unknown.

5.2 Decommissioning Alternatives

The following decommissioning alternatives have been identified for this facility, and are described below:

a. Protective Storage
b. Dismantlement and Disposal
c. Entombment

a. Protective Storage. This alternative involves placing the area into protective storage by fencing the area and locking the building to minimize human intrusion, and providing appropriate warning signs to indicate the hazards within the fenced area. Appropriate entrance procedures would be developed, such as requiring protective clothing, should access to the area be required. Routine monitoring of the area would be conducted to detect movement of contamination from the site. This alternative also includes relocation of all contaminated equipment outside to inside the building.

b. Total Dismantlement and Disposal. This alternative involves dismantling the building and contaminated equipment, where possible. The concrete pad would be demolished and the contaminated soil excavated. Conventional excavation equipment and techniques would be used. The contaminated materials would be disposed of in an approved waste disposal facility, and transported

in an environmentally acceptable manner. This would include the demolition and removal of the concrete floor and pits within the building, and the outside concrete pad. The excavation will be backfilled with clean materials. The site would then be graded and reseeded.

c. Entombment. Entombment of this building is deemed impractical, so this alternative includes removal and disposal of the building and all above-ground equipment before entombment of the remainder of the facility. This entombment involves filling the pits and then covering the concrete floor, the pits, the outside concrete pad, and the contaminated soils with a protective cover consisting of soil, clay, asphalt, concrete, or other appropriate material. Prior to entombment, a detailed radiological survey would be made for the facility closure report.

6.1 Storage Pad (3503)

This facility consists of an unoccupied pad located between Buildings 3503, 3504, and Southside Drive. The pad is 40 ft x 50 ft and was used from the 1950s to 1982 as a storage location for nuclear materials. Approximately 25 percent of the pad is covered by a metal shed. A portion of the pad under the shed is covered by 15 ft x 15 ft x 2 inch metal trays to prevent runoff of spilled liquid. Past operations resulted in contamination of the concrete surface and necessitated an additional 4 inch layer of concrete to be poured in the late 1970s. The contamination on the original concrete surface was estimated to be 1×10^5 dpm/100 cm^2 from U-233 and Pu-239. The current surface of the pad is, for the most part, contamination free; however, in the vicinity of the metal trays the surface is contaminated and produces radiation up to 1 mR/h at contact. The soil within a three foot area, from the edge of the south and west sides of the pad, is contaminated to levels producing up to 3 mR/h. The surface of the pad and the metal shed is in fair condition.

6.2 Decommissioning Alternatives

The following decommissioning alternatives have been identified for this facility, and are described below:

a. Protective Storage
b. Dismantlement and Disposal
c. Entombment
d. Partial Dismantlement

a. <u>Protective Storage</u>. This alternative involves fencing the area to minimize human intrusion, and providing appropriate warning signs to indicate the hazards within the fenced area. Appropriate entrance procedures would be required, such as requiring protective clothing, should access to the area be required. Routine monitoring of the area would be conducted to detect migration of contamination from the facility.

b. Dismantlement and Disposal. This alternative involves dismantlement and disposal of the surplus facility and restoration of area to an unrestricted use condition. Non-explosive demolition techniques, such as backhoe mounted rams, rock splitters, demolition compounds, and sawing would be used to dismantle the concrete. Radioactive dust would be controlled by a water spray. The water would be filtered and routed into the process waste system. The concrete and filtered dust would be appropriately packaged, labeled, and disposed of in an approved waste disposal facility. The metal shed and metal trays would be dismantled and disposed of in an approved landfill. The contaminated soil surrounding the site would be excavated for treatment or disposal in an approved waste disposal facility. Conventional excavation techniques would be used. The excavation, due to decommissioning activities, would be backfilled with clean materials.

c. Entombment. This alternative involves removal of aboveground items and covering the concrete pad and soils with a protective surface cover, consisting of soil, clay, asphalt, or concrete. A layer of soil may be placed over the clay, asphalt, or concrete protective covers for aesthetic reasons. Some soil excavation may be required for installation of the surface cover.

d. Partial Dismantlement. This alternative involves the dismantlement of the shed and removal of the aboveground items. The uncontaminated materials would be disposed of in the contractor's landfill, and contaminated materials disposed of in an approved waste disposal facility.

7.1 Offgas Filter House (3121)

This facility consists of a small concrete block building (12 ft x 12 ft x 10 ft) constructed on a concrete pad. It contains two parallel HEPA filter banks with dampers and demisters. The house has been fit with a gable roof above the original flat roof to improve containment and retard degradation and has a floor drain which is connected to the LLW system. Currently the structure is in good condition and has recently been upgraded to seal potential leaks. The interior of the house has also undergone a recent cleanup and decontamination but remains a contaminated zone. Radiologically, the interior is contaminated with transuranic materials (U-232, U-233, and daughter products). The radiation levels range from 1×10^3 dpm/100 cm^2 to 1×10^6 dpm/100 cm^2 alpha. Radon is also known to be present from the decay of these isotopes.

7.2 Decommissioning Alternatives

The following decommissioning alternatives have been identified for this facility, and are described below:

a. Decontamination, Leave in Place
b. Decontamination, Repair, and Reuse
c. Protective Storage
d. Total Dismantlement and Disposal

a. Decontamination, Leave in Place. This alternative involves the removal of radioactivity from the surfaces of the building and equipment. All equipment would remain in place where practical. Any items not decontaminated would be removed and disposed of in an appropriate waste disposal facility.

b. Decontamination, Repair, and Reuse. This alternative involves reconditioning the facility by removal of all radioactivity, making repairs after radioactive material has been removed, and making the facility available for other use.

c. Protective Storage. This alternative consists of locking and sealing the building to minimize personnel intrusion and posting per radiation protection procedures. This alternative would also require that monitoring for air discharge be maintained.

d. Total Dismantlement and Disposal. This alternative entails the complete removal of the structure and equipment from the facility and disposal at an approved waste disposal or treatment facility. A containment structure would be constructed around the building prior to dismantlement to control the contaminants during dismantlement. The removal of the vent line from Building 3019 would be included in this alternative and it would be disposed of with the rest of the contaminated equipment.

8.1 Tower Shielding Facility (TSF) (7700)

The TSF surplus equipment is located about 2.5 miles south of the ORNL main complex. The surplus equipment is the result of many experiments conducted at TSF during the past 32 years. The TSF and surplus equipment are fenced and access to the area is through a manned gate. The site contains one large rectangular sodium-filled shield which shows evidence of leakage. However, the leak appears to have healed itself. Another area of concern is a group of depleted uranium sheets contained in a corroded aluminum box. These sheets are adequately contained but if the corrosion continues, the container could be breached. In addition, the site contains scrap shields, tanks, pumps, a spherical reactor shell, and miscellaneous materials. Much of the surplus equipment has been exposed to sources of neutron flux from operating reactors, but only a small portion of this equipment contains measurable levels of radioactivity.

8.2 Decommissioning Alternatives

The following decommissioning alternatives have been identified for this site, and are described below:

a. Protective Storage of Depleted Uranium Sheets
b. Dismantlement and Disposal of Depleted Uranium Sheets
c. Protective Storage of Breached Sodium Filled Shield
d. Transfer of Sodium to a New Tank
e. Rupture of the Sodium Tank in the Explosive Detonation Trench
f. Commercial Disposition of the Sodium Tank
g. Segregation plus Sub-Alternative

a. <u>Protective Storage of Depleted Uranium Sheets</u>. This alternative involves placing the corroded aluminum container inside the metal storage building on site, or constructing a small metal shed to house the depleted uranium sheets. As an added precaution, the corroded container could be

placed inside a new container. The new container and/or building would be labeled with the appropriate warning signs. Appropriate access procedures would be developed, such as requiring protective clothing, should access to the material be required. Routine monitoring would be conducted to assure the integrity of the container.

b. Dismantlement and Disposal of Depleted Uranium Sheets. This alternative involves dismantlement of the corroded aluminum box and repackaging the depleted uranium sheets. The depleted uranium sheets and aluminum box would be disposed of in an approved waste disposal facility.

c. Protective Storage of Breached Sodium Filled Shield. This alternative involves placing the breached shield tank in a large tank with an oil media between the two. Adequate precautions would be taken to minimize sodium contact with moisture. Once placed inside the larger tank, the shield would be stored in the metal building on site. Routine monitoring would be conducted to assure the integrity of the tanks.

d. Transfer of Sodium to a New Tank. This alternative involves overpacking, transporting, and transferring the sodium from the breached tank to a new tank. The breached tank is overpacked in a liquid hydrocarbon filled tank and transported to a facility capable of transferring the sodium from one tank to another. The sodium would then be melted by circulating hot oil. The molten sodium would be withdrawn from the breached tank by a vacuum pump and placed inside the new tank.

e. Rupture of Breached Sodium Shield Tank in the Explosive Detonation Trench. This alternative involves transporting the sodium shield tank to the explosive detonation trench in SWSA 6 and opening the tank with an explosive charge. As an added precaution, an adequate amount of soda-ash should be readily available for fire suppression.

f. Commercial Disposition. This alternative consists of contracting with an outside commercial operator to take title to the sodium and process it or use it. This alternative presumes that the sodium is uncontaminated.

g. Segregation plus Sub-Alternative. This alternative involves segregation of the scrap material into contaminated and uncontaminated groups. A geochemical soil survey would be conducted in areas where contaminated materials are found. Following segregation, a sub-alternative would be selected. The process is outlined in Figure 2.1, and the sub-alternatives are described below.

- Uncontaminated Material Alternatives:

  Leave as is. Because the material is uncontaminated, no further action is required.

  Recycle/Salvage. This alternative involves selling the reusable materials to commercial metal recycling companies.

  Disposal in Landfill. This alternative involves disposing the surplus material in the contractor's landfill or similar nearby landfill.

- Contaminated Material Alternatives:

  Protective Storage. This alternative involves fencing the contaminated equipment to minimize human intrusion, and providing appropriate warning signs to indicate the hazards within the fenced areas. Appropriate entrance procedures would be developed, such as requiring protective clothing, should access to the protected areas be required. Routine monitoring of the area would be conducted to detect migration of contamination from the site.

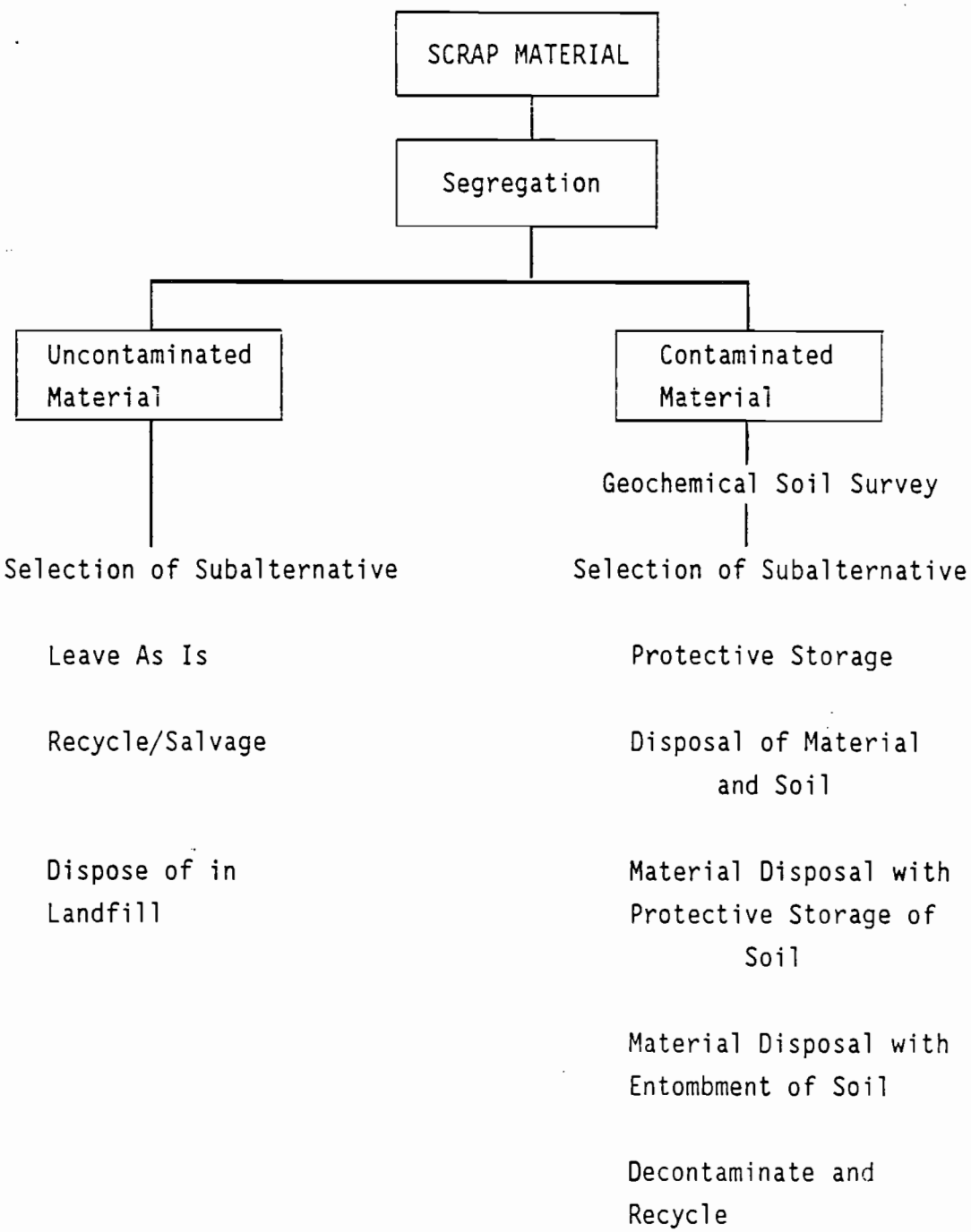
Disposal of Material and Soil. This alternative involves the disposal of the contaminated surplus material and soils in an approved waste disposal facility. The surplus material would be shielded, contained, transported, and disposed of in accordance with approved ORNL procedures. Conventional excavation equipment and techniques would be used to remove the contaminated soil. The removed soils would be transported for disposal in accordance with approved ORNL procedures. The resulting excavation would then be graded and reseeded.

Material Disposal with Protective Storage of the Soil. This alternative is the same as above with the exception of excavation of soil. A fence would be placed around the perimeter of the contaminated soil area, and appropriate warning signs installed. Routine monitoring of the sites would be conducted to detect migration of contamination from the area.

Material Disposal with Entombment of Soil. This alternative is the same as above with the exception of soil. Entombment is accomplished by covering the soils with an impermeable media, such as asphalt, concrete, or a geomembrane. This will prevent leaching by infiltrating rainwater. Because all contaminated materials are above ground, contamination of the soils should be relatively near the surface. Thus, a diversion ditch may be required to keep rainwater from infiltrating upslope and migrating laterally through the contaminated area.

Decontaminate and Recycle. This alternative involves decontaminating the scrap material and selling the materials to a commercial scrap yard. Decontamination and the sale of the scrap material would be in accordance with approved ORNL procedures.

Outline of Subalternatives for TSF Surplus Materials



9.1 High-Level Chemical Development Laboratory (4507)

This facility, located in building 4507 of the Main ORNL Complex, contains four hot cells and associated equipment for handling highly irradiated alpha-beta-gamma sources on the ground level and a chemical make-up area on the second level. The building is also equipped with a penthouse superstructure above the hot cells which contains gloveboxes, a shielded manipulator cave for small-scale work, and a gantry crane for handling shielded casks.

9.2 Decommissioning Alternatives

The following decommissioning alternatives have been identified for this facility, and are described below:

a. Decontamination, Repair and Reuse, and Partial Dismantlement
b. Protective Storage
c. Dismantlement and Disposal

a. Decontamination, Repair and Reuse, with Partial Dismantlement. This alternative involves several steps. The first is to decontaminate, to the extent possible, the equipment and the facility. Next, repair and reuse the facility and equipment that was decontaminated or dismantle nonreuseable equipment and dispose as surplus equipment at K-25 or as contaminated radioactive material.

b. Protective Storage. Post entryways for limited access and radiation hazard and monitor for migration of contaminants.

c. Dismantlement and Disposal. This alternative involves total dismantlement of the equipment and demolition of the facility. The contaminated debris would be disposed of in an approved landfill. The resultant excavation would be backfilled with clean soil, graded, and reseeded.

10.1 High Radiation Level Analytical Facility (3019-B)

This facility consists of the inactive High Radiation Level Analytical Facility (HRLAF), located in Building 3019-B of the ORNL main plant area. The facility is constructed adjacent to the Radiochemical Processing Plant (3019). This facility was operational from 1955 to 1980, and was used for separating, processing, and analyzing highly radioactive samples, including fission products, activation products, uranium, plutonium, and other TRU materials.

The facility consists of a bank of 7 hot cells and a central storage cell used for transfer of materials into, out of, and between the cells. Each of the hot cells is equipped with master-slave manipulators and cell access drawers. A rear access area also provides entry to the back of the cells.

An electrically powered cart was used to transport radioactive samples to and from the storage cell. A conveyer belt (still operational) was used to distribute samples between hot cells.

An exhaust ventilation system maintains the cell access and operating areas slightly below atmospheric pressure. The cells and hoods are maintained at a pressure below the cell access and operating areas. The ventilation system discharges to the Building 3108 filter pit and is filtered through roughing and HEPA filters prior to discharge.

Equipment from the cell operating area (chemical fume hoods, and storage cabinets) has recently been removed.

The current condition of the building shows significant degradation. The inner window pane of cell 2 is broken, and zinc bromide (the window fluid) is leaking. Most of the cell windows show some leakage of zinc bromide because of corrosion of the steel window frames. The cell windows are mostly opaque because of suspension of corrosion and hydrolysis products. The vinyl lining on the cell interiors is spalling, and the underlying concrete is becoming contaminated.

The LLW drain line has been removed from service because of loss of structural integrity. The exhaust ventilation ductwork also exhibits corrosion.

Substantial quantities of analytical and mechanical equipment are still contained in the cells. Some surfaces have been painted.

Because of the highly radioactive materials handled in the past, the cells and their ancillary equipment including exhaust ducts are contaminated with long lived fission products and alpha radiation. Radiation levels are estimated to be in excess of 100 rad/hr. The radiation field adjacent to the zinc bromide leak is 35 mR/hr. Other hazards include asbestos insulation on steam and water lines and the chemical hazard from the zinc bromide.

10.2 Decommissioning Alternatives

The following decommissioning alternatives have been identified for this site, and are described below:

a. Decontamination
b. Protective Storage
c. Dismantlement and Disposal

a. Decontamination. This alternative involves decontamination and repair of the facility for re-use. All radioactive materials would be removed from the laboratory to an appropriate storage or waste disposal facility. The existing LLW drain lines, the asbestos insulation on the steam lines, and the exhaust system would be removed. The cell windows would be replaced and the leaking zinc bromide cleaned up. The cell interiors would be emptied of all miscellaneous equipment. The equipment would be decontaminated for re-use if appropriate. Otherwise, it would be packaged and disposed of in an approved waste disposal facility. The cell manipulators, conveyer belt, and cell access drawers would be decontaminated, repaired, and upgraded as appropriate. Cell interiors would be decontaminated and floor tiles would be replaced.

b. Protective Storage. This alternative involves sealing all entrances to this facility and the installation of appropriate warning signs describing the hazards within. This would also require the establishment of strict security procedures to control entry into the area. Periodic maintenance inspections and monitoring would be required to assure the containment of all contaminants.

c. Dismantlement and Disposal. This alternative is similar to a, above, except that it does not consider "repair for re-use" of any equipment or ancillary systems within the facility. This alternative would be a carefully planned dismantlement, packaging, and disposal of all removable parts of this facility. After the facility was completely stripped, the inner surfaces (walls and floors) would be decontaminated to as near background levels as practicable.

11.1 Remote Coating Furnace Loop (4508, Rm 265A)

This facility and its associated support equipment is located in Room 265A of Building 4508 of the Main ORNL Complex. Equipment associated with this facility, with the exception of a glovebox, scrubber, and the controls and instruments, are contained in a transparent plexiglas enclosure covering approximately 190 ft^2. It was commissioned in 1960 and taken out of service in 1980. Primary wastes are U-238 and Th-232. The maximum transferable contamination levels within the enclosure are less than 5,000 dpm/100 cm^2 alpha, and the maximum background levels are less than 10 mR/h. Radiation measurements within the furnace loop were less than 600 dpm/100 cm^2 alpha.

11.2 Decommissioning Alternatives

The following decommissioning alternatives have been identified for this facility, and are described below:

a. Protective Storage
b. Dismantle and Dispose
c. Partial Decontamination and Dismantlement

a. Protective Storage. Post entryways for limited access and radiation hazard and monitor for migration of contaminants.

b. Dismantlement and Disposal. This alternative involves dismantling the facility and all of the associated equipment. The noncontaminated equipment would be sent to K-25 as surplus and the contaminated equipment would be transferred to an approved waste disposal facility.

c. Partial Decontamination and Dismantlement. This alternative involves careful dismantlement of the process equipment for reuse or resale. The remaining support equipment would be dismantled as scrap; sending noncontaminated equipment to K-25 as surplus and the contaminated equipment to an approved waste disposal facility.

12.1 Ceramic Processing Laboratory (4508, Rm 189)

This facility is located in the Room 139 complex of Building 4508 of the Main ORNL Complex. The inventory of this site has been estimated at less than 1.0 Ci, composed of Th-232, U-232, and U-233 and much less than 1.0 kg of polynuclear aromatic hydrocarbons. Several transformers containing PCB contaminated oil are also stored here.

12.2 Decommissioning Alternatives

The following decommissioning alternatives have been identified for this facility, and are described below:

a. Protective Storage
b. Decontamination, Repair, and Reuse
c. Partial Dismantlement and Decontamination

a. Protective Storage. Post entryways for limited access and radiation hazard and monitor for migration of contamination.

b. Decontamination, Repair, and Reuse. This alternative involves decontaminating the entire facility and its associated equipment. The equipment would be repaired as necessary and reused, with the exception of the transformers which must be disposed of in an approved waste disposal facility.

c. Partial Dismantlement and Decontamination. This alternative involves dismantlement and removal of equipment not to be reused. The specific pieces of equipment to be removed would be defined by ORNL. Equipment would be decontaminated when appropriate. Contaminated equipment would be transferred to an approved waste disposal facility and noncontaminated equipment would be sent to K-25 as surplus. The facility and remaining equipment would be decontaminated and reused.

13.1 Transuranium Research Laboratory (5505, Rm 45)

This facility is located in Room 45 of Building 5505 at ORNL. The room is used for storing thirteen gloveboxes and a fume hood. Room 45 was initially used to provide a central holding area for radionuclides and to provide additional security and accountability for special materials. The gloveboxes are free of external contamination, but contain variable levels of internal contamination up to 1×10^6 dpm/100 cm^2 alpha.

13.2 Decommissioning Alternatives

The following decommissioning alternatives have been identified for this facility, and are described below:

a. Protective Storage
b. Dismantlement and Disposal

a. Protective Storage. This alternative involves placing the gloveboxes into a protective storage area, perhaps a section of Room 45, and fencing or otherwise enclosing this area to minimize human intrusion, and then providing appropriate warning signs to indicate the hazards within the fenced area. Appropriate entrance procedures would be developed, such as requiring protective clothing, should access to the area be required. Routine monitoring of the area would be conducted to detect migration of contamination from the site.

b. Dismantlement and Disposal. This alternative involves packaging and disposing of ten gloveboxes and one fume hood in an approved waste disposal facility. Contamination in the room resulting from this operation would be removed chemically or by high pressure jets to return the room to background levels.

14.1 Cobalt-60 Storage Garden (3029)

This facility consists of a subterranean chamber containing 92 stainless steel tubes housing Co-60 pellets in the lower ends of the tubes. The chamber as well as the entire facility is shielded with lead and concrete. The garden was used as an irradiation facility for high-flux gamma exposure of a wide variety of specimens. The garden currently has an inventory of about 50,000 Ci of metallic Co-60. The external surfaces of the chamber shield have transferable contamination less than 500 dpm/100cm^2 (beta-gamma). No chemical hazards are associated with the storage garden.

14.2 Decommissioning Alternatives

The following decommissioning alternatives have been identified for this facility, and are described below:

a. Dismantlement and Entombment
b. Entombment
c. Dismantlement and Decontamination
d. Protective Storage

a. Dismantlement and Entombment. This alternative involves removing the grate above the subterranean chamber and stainless steel tubes containing the Co-60 pellets, and disposing of them in an approved waste disposal facility. The cavity would be filled with concrete and then a cap would be fabricated and placed over the top. No additional decontamination is anticipated.

b. Entombment. This alternative involves removing the grate above the subterranean chamber and disposing of it in an approved waste disposal facility. The chamber, with the tubes in place, would be filled with concrete and the area would then be posted.

c. Dismantlement and Decontamination. This alternative involves removing the grate above the subterranean chamber and the tubes and disposing them in

an approved waste disposal facility. The irradiation chamber would then be decontaminated if possible, or sealed, to fix the contamination. The room would then be decontaminated chemically or by using high pressure jets to return the room to background condition.

d. Protective Storage. This alternative involves construction of a sealed enclosure, or fence, around the Co-60 garden to minimize human intrusion, and posting appropriate warning signs indicating the hazards inside. This would require appropriate access procedures and periodic perpetual monitoring.

15.1 Strontium-90 Power Generators

This facility consists of four Sr-90 thermoelectric generators stored at ORNL. SNAP-70 is stored inside Building 3001 and Sentury, SNAP-7B and SNAP-7C are stored outside in a staging area south of Building 3047. Each unit consists of one or more welded strontium titanate sources inside a shielded thermoelectric device. The primary waste is Sr-90 and the current inventories are: Sentury, 8,895 Ci; SNAP-7B, 119,480 Ci; SNAP-7C, 20,260 Ci; and SNAP-7D 117,470 Ci.

15.2 Decommissioning Alternatives

The following decommissioning alternatives have been identified for this facility, and are described below:

a. Protective Storage
b. Disposal
c. Dismantlement and Disposal

a. Protective Storage. Store in an area posted for limited access and radiation hazards, and monitor for generator degradation.

b. Disposal. Place the generators in separate crates and transfer to an approved waste disposal facility.

c. Dismantlement and Disposal. The Sr-90 generator containers would be cut open to expose the internals for disassembly and appropriate disposal. The Sr-90, the thermoelectric generators, the lead shielding, and the external structures would be surveyed and disposed appropriately.

16.1 Filter House (3110)/Isotopes Ductwork

The filter house is a two-level concrete structure located partially below grade containing 42 HEPA and roughing filters. The facility is isolated from the vent system by louvers which, when adjusted, maintains the filter house under a slight negative pressure. The underground ductwork is blanked off from the buildings it served during its operational period, but contains high levels of radioactivity from past operations within these facilities. A sump pump is maintained in the ductwork for removal of inleakage and transfers this waste to the LLW System.

16.2 Decommissioning Alternatives

The following decommissioning alternatives have been considered for this facility, and are described below:

a. Decontamination and Leave in Place
b. Protective Storage
c. Total Dismantlement and Disposal
d. Entombment

a. Decontamination and Leave in Place. This alternative would involve the removal of as much of the high level sources of radioactivity as possible and decontamination of the remaining structure to the guidelines stated in the Radiation Protection Procedures. This would also require air monitoring for discharge and surveillance as presently scheduled.

b. Protective Storage. This alternative would involve securing the filter house and ductwork against casual access and leaving the facility as is until such time as when complete removal is required or when the aboveground vent system becomes ineffective.

c. Total Dismantlement and Disposal. This alternative would completely remove the facility from the present location and dispose of the contaminated

materials in a safe manner as required by ORNL procedures. This would require extensive planning for the ductwork removal due to the expected high radiation levels and the location within the isotopic processing circle. The amount of radwaste to be disposed would be considerable, including the concrete, and also possibly soil that may be contaminated during excavation for access to the ductwork. Containment would be required to control contamination spread during removal.

d. Entombment. This would entail removal of existing filters, plugging the far ends of the ducts, characterizing the facility internals, and filling the facility with an approved radiological grout (concrete, styrofoam, or other).

17.1 Eighty-six Inch Cyclotron, (9201-2) Y-12

This facility consists of

- an 86-inch cyclotron (radiologically contaminated)
- an oil coolant system
- a hot cell (radiologically contaminated)
- a control console, instrument racks, and Switch Gear (uncontaminated)
- two AC-DC power generators (uncontaminated)

The cyclotron unit includes a large steel magnet yoke (250 tons), four oil cooled magnet coils, an ion accelerator chamber, and ancillary equipment. It is located in the basement of the building. The floor of the high bay area above the cyclotron is constructed of removable concrete shield blocks.

The oil coolant system consists of piping, pumps, and a storage tank containing an estimated 15,000 gal of Code AE transformer oil containing < 10 ppm PCBs. The reservoir tank is located outside the building. The storage tank and outdoor piping is not the responsibility of the RAP program and will not be included in the decommissioning estimates.

The radioactive hot cell is adjacent to the cyclotron enclosure. It contains one set of manipulators, one view port, and a small monorail crane track (perhaps 2000 lb capacity) overhead.

The other equipment, the controls, switch gear, instrumentation and AC-DC generators are uncontaminated and located away from the contaminated area.

17.2 Decommissioning Alternatives

The various systems noted above have been reviewed and divided into groups with appropriate alternatives identified for each group. These are listed and discussed in the following subparagraphs.

17.2.1 Control Center, Switch Gear, and AC-DC Power Generator

a. Dismantlement and Disposal

These items are reportedly free of contamination. After a complete radiation survey they would be green tagged and sent to K-25 Salvage Sale Yard. Standard dismantling procedures should be used for removal of this clean equipment with ordinary handling methods.

17.2.2 Coolant Oil Lines, Tank Transformers, and Capacitors

The coolant oil system is not radiologically contaminated.

a. Decontamination and Leave in Place
b. Decontamination, Repair and Reuse
c. Dismantlement and Disposal

a. Decontamination and Leave in Place. This alternative requires the removal of oil/components, contaminated with PCBs and/or radioactive isotopes, per ORNL procedures.

b. Decontamination, Repair, and Reuse. This alternative is similar to the one above with the following exception; after decontamination the equipment would be repaired for reuse.

c. Dismantlement and Disposal. This alternative is the total removal of components from the site. It includes draining the oil, and disposal of storage tanks and lines, packaging for disposal per ORNL Procedures, removal of transformers and capacitors, and disposal. Disposal alternatives will depend on the final status of each item.

17.2.3 Cyclotron Unit

a. Decontamination and Leave in Place
b. Protective Storage
c. Dismantlement and Disposal

a. Decontamination and Leave in Place. This alternative involves the removal of the contamination residue in the unit itself, by flushing, scraping, or other mechanical means. With the contamination removed, the surrounding area and the cyclotron could be released for unrestricted access.

b. Protective Storage. This alternative is very similar to the current status, the locked access, radiation protection requirements, etc. This alternative would restrict access to areas of higher than background radiation thus minimizing exposure to personnel and release of radioactivity to the surrounding areas. Monitoring, maintenance, and surveillance activities would be continued per current levels or as required to ensure confinement.

c. Dismantlement and Disposal. This alternative involves total removal of the unit and disposal per ORNL procedures. Due to the size and weight of this unit, two alternatives for removal have been reviewed. One is to dismantle the magnetron and remove it through an opening in the building wall. The second option would be to cut up the large items into pieces which could be moved through the high bay area to the rollup door at the other end of the building. Disposal of equipment would be per ORNL procedures. In the second scenario, each piece would be surveyed to segregate clean from contaminated waste.

17.2.4 Hot Cell and Area

a. Decontamination and Leave in Place
b. Protective Storage
c. Dismantlement and Disposal

a. Decontamination and Leave in Place. This alternative involves decontamination of the structural walls, ceiling, and floor to releasable levels and removal of all material that is contaminated. The area would then be released for unrestricted use.

b. Protective Storage. This alternative would place the cell in a confined access condition by installation of a permanent barrier around the cell area to prevent exposure to personnel and to contain the radioactivity.

c. Dismantlement and Disposal. This alternative involves removal of the structure from the site by physically removing material and manipulators for disposal as radioactive material. A temporary containment would be required during the removal to prevent the spread of contamination caused by sectioning the concrete walls and decontamination of the floor and overhead. Sectioning the cell would be required to permit the movement of material out of the building for disposal.

18.1 Plutonium Process Condensate Tank (9720-8, Y-12)

This site consists of an inactive 500-gal steel tank, located in the equipment storage area across the creek from Building 9720-8 at Y-12. The tank is located aboveground, mounted on a permanently attached stand. The tank was used during the 1950s and 1960s to transport plutonium process condensate from Building 9204-3 at Y-12 to ORNL for disposal.

The tank is reported to be in good condition, and all existing openings are sealed. The tank exterior is reported to be contaminated, but has been protected with a paint sealant, and has radiation levels less than 1 mR/h. The external transferable alpha contamination is less than 30 dpm/100 cm^2, and beta is 200 dpm/100 cm^2. No known chemical hazards exist. The tank interior is highly contaminated, with alpha radiation levels of 500,000 dpm/100 cm^2.

18.2 Decommissioning Alternatives

The following decommissioning alternatives have been identified for this site, and are described below:

a. Protective Storage
b. Dismantlement and Disposal

a. Protective Storage. This alternative involves removing the tank from the current site to a more secure area. Since the tank is already sealed, is easy to load onto a truck, and little external transferable contamination exists; transport can be readily accomplished. The tank would be secured in a fenced area, in a covered shed, and not placed directly onto the ground. Periodic monitoring and surveillance would be required to assure that the tank remains in good condition.

b. Dismantlement and Disposal. This alternative involves dismantling the tank from the external supports, connecting piping and valves, and all external features using appropriate cutting techniques. The tank openings would be sealed, and the tank, and all removed equipment would be disposed of in an appropriate waste disposal facility.

19.1 Plutonium Processing Facility (9209, Rm-116) Y-12

This facility consists of an L-shaped glovebox located in Room 116 of Building 9204-3 (ORNL Y-12). The facility was used solely for the generation of Pu-240 and Pu-242. Both the equipment and box components are highly contaminated with alpha radiation levels greater than 500,000 dpm/100 cm^2. No transferable contamination has been detected on external surfaces, except at the bottom of the enclosure where the radiation level is less than 2 mR/h.

19.2 Decommissioning Alternatives

The following decommissioning alternatives have been identified for this facility, and are described below:

a. Protective Storage
b. Dismantlement and Disposal

a. Protective Storage. This alternative involves placing the area into protective storage by locking the door to minimize human intrusion, and providing appropriate warning signs to indicate the hazards within the fenced area. Appropriate entrance procedures would also be developed, such as requiring protective clothing, should access to the area be required. Routine monitoring of the area would be conducted to detect migration of contamination from the site.

b. Dismantlement and Disposal. This alternative involves dismantling the glovebox and evaporator tanks and disposing them in an approved waste disposal facility. When complete, the room would be decontaminated to return the room to background conditions.

20.1 Radioisotope Processing Facility-Curium Handling Glovebox (9204-3) Y-12

This facility consists of a glovebox located at the ORNL Y-12 Facility in an enclosed area on the second floor of Building 9204-3. The glovebox measures 3 ft x 5 ft and was used to support curium operations during the late 1960s through the mid-1970s. The glovebox is in good condition, maintained under negative pressure, and located in a contaminated operating area which provides secondary containment. The interior of the glovebox is highly contaminated with alpha levels of 500,000 dpm/100 cm^2. External levels are less than 2 mR/h, and transferable contamination levels are less than 5,000 dpm/100 cm^2 alpha.

20.2 Decommissioning Alternatives

The following decommissioning alternatives have been identified for this facility, and are described below:

a. Protective Storage
b. Dismantlement and Disposal

a. Protective Storage. This alternative involves removal of the glovebox legs and external piping and placing the glovebox into a protective storage area, perhaps in this same building, and fencing or otherwise enclosing this area to minimize human access and then providing appropriate warning signs to indicate the hazards within the enclosure. Appropriate security procedures would be required to gain access to the facility, and periodic perpetual monitoring would be required to ensure proper containment.

b. Dismantlement and Disposal. This alternative involves removal of the legs, filling the internal void space with a filler media, and placing the glovebox in a package designed for disposal. The operation would be conducted by remote handling methods to the extent possible, and workers would need protective clothing. The container would be disposed of in an approved waste disposal facility.

21.1 MSRE Fuel Handling Facility (9201-3) Y-12

The facility is a fuel preparation facility approximately 16 ft x 16 ft x 30 ft high. The cell is generally contaminated throughout including the floors, sinks, piping, and ventilation ductwork. The facility has been inactive for 16 years but remains in good condition and presents no potential hazards to personnel. The facility is inactive but is contained within an active area of the building. Radiologically, the results of a 1985 survey indicates readings ranging from 5,000 to 50,000 dpm/100cm^2 (beta-gamma). The contamination is the result of residual U-233 and Th-226.

21.2 Decommissioning Alternatives

The following decommissioning alternatives have been identified for this facility, and are described below:

a. Decontamination and Leave in Place
b. Protective Storage
c. Dismantlement and Disposal

a. Decontamination and Leave in Place. This alternative entails the use of proper decontamination techniques to remove the radioactivity left on the facility walls, floor, sinks, and ductwork.

b. Protective Storage. This alternative would be one that requires a barrier installed at a distance to protect personnel from undue exposure and prevent the release of contamination. Monitoring and maintenance would be maintained to keep the facility in its current state of repair and to provide data for air release records.

c. Dismantlement and Disposal. This alternative involves removal and disposal of the facility from the active laboratory. The dismantlement procedures would have to be well planned. The structure is sectional with lifting lugs on each section. The removal of sections in their entirety would

be considered to ease the job of free release requirements per ORNL Radiation Protection Manual. The ceiling is sectioned for removal of items too large for the access doorway. Results of the inspection tour indicates that there is ample office furniture that may be clean and it would be removed from the area to reduce the generation of waste that would require burial.

22.1 Coolant Salt Technology Facility, Tritium Test Loop (9201-3) Y-12

The Tritium Test Loop is located at the ORNL Y-12 facility on the second floor of Building 9201-3. The facility was used to inject tritium into a boron trifluoride flow in support of the MSRE from 1958 through 1969. The facility consists of a loop flow system surrounded by a steel enclosure measuring approximately 24 ft x 8 ft x 10 ft tall. The system is comprised of pumps, tankage, valves, piping, and the remnants of a control system. The inside of the flow system remains contaminated with radiation levels up to 40,000 dpm/100 cm^2 alpha, and transferable contamination of 1,000 dpm/100 cm^2 alpha and 3,500 dpm/100 cm^2 beta.

22.2 Decommissioning Alternatives

The following decommissioning alternatives have been identified for this site, and are described below:

a. Protective Storage
b. Decontamination and Leave in Place
c. Decontamination and Salvage
d. Dismantlement and Disposal

a. Protective Storage. This alternative involves removal of uncontaminated items to K-25 salvage and isolating the remaining contaminated parts of the facility from personnel. Appropriate warning labels will be placed on the facility, and entrance procedures would be developed, such as requiring protective clothing, should access be required. Routine monitoring would be conducted to detect any contamination migration.

b. Decontamination and Leave in Place. This alternative involves decontamination of the facility by chemical or other acceptable methods. Dismantlement would be minimal and the facility would be left in place except for parts which are loose or would be removed for decontamination. The removed parts would be transferred to K-25 salvage.

c. Decontamination and Salvage. This alternative involves decontamination of the facility by chemical or other acceptable methods. Following decontamination, the facility would be dismantled and transferred to K-25 salvage.

d. Dismantlement and Disposal. This alternative involves dismantlement of the facility and disposal of the components as clean salvage or radwaste as appropriate. After dismantlement and disposal of the Test Loop and instrumentation racks, the floor area of building 9201-3 would be decontaminated as necessary for unrestricted release.

23.1 Storage Tank (9201-3) Y-12

This facility consists of an inactive 3,000-gal glass-lined storage tank, located in Building 9201-3 at the Molten Salt Reactor Experiment (MSRE) at Y-12. The tank is located in a mezzanine room, and is surrounded by a spill-containment dike. The tank is reported to be empty, and in good condition. Access to the tank area is by climbing a ladder.

The storage tank was used to hold cutting oil for a machine shop between 1958 and 1969. The tank is free of internal contamination. The tank exterior is slightly contaminated with alpha radiation (4,000 dpm/100 cm^2), but the contamination has been sealed with a coat of paint. The tank is located in a C-zone designated room because of alpha contamination near the room entrance. The contamination has been fixed with paint.

23.2 Decommissioning Alternatives

The following decommissioning alternatives have been identified for this site, and are described below:

a. Decontamination
b. Protective Storage
c. Total Dismantlement and Disposal

a. Decontamination. This alternative involves decontaminating the exterior of the tank using appropriate mechanical abrasive techniques (i.e., grinding, or dry abrasive blasting) to remove the paint sealant and the exterior contamination. No decontamination of the tank interior is required. After decontamination, the tank would be left in place and released for other use.

b. Protective Storage. This alternative involves placing the area into protective storage by sealing the entrance into the room, and removing the access ladder to minimize human intrusion. Appropriate warning signs would be placed below the room entrance.

c. Total Dismantlement and Disposal. This alternative involves dismantling the tank for disposal. Pipes and valves attached to the tank would be removed using appropriate cutting techniques. Because of the limited access to the room, the equipment would be cut into pieces small enough to be removed through the existing ladder access. The tank would then be sectioned into appropriate sized pieces for removal. The wastes would be disposed of in an appropriate waste disposal facility.

24.1 Contaminated Attic Area (Building 9204-1) Y-12

This facility is a contaminated attic on the second level of Building 9204-1 at the Y-12 plant. The contamination is confined to the original ceiling and beams (which are still partially covered with paint). The total attic area marked as a contamination zone is about 59 ft x 79 ft. The specific isotopes in this area are unknown. Transferable alpha levels in the area range from 10 to 275 dpm/100 cm^2. The maximum beta-gamma level was 50 cpm (< 1.0 mR/h).

24.2 Decommissioning Alternatives

The following decommissioning alternatives have been identified for this facility, and are described below:

a. Protective Storage
b. Decontamination, Repair, and Reuse

a. Protective Storage. Post entryways for limited access and radiation hazards and monitor for migration of contamination.

b. Decontamination, Repair, and Reuse. This alternative involves decontaminating the attic while the areas beneath would be evacuated and a protective plastic cover would be placed over any equipment or furniture to prevent the spread of contamination. The attic walls and roof would be hand cleaned as would the ducting, piping, and conduit contained in this area. The attic floor would be vacuumed and the entire area would then be surveyed and repainted. The protective plastic would be carefully disposed of in an approved manner.

25.1 East End Basement (9204-1) Y-12

This facility is composed of two adjacent contaminated soil areas located in the basement crawl space of the east end of Building 9204-1 at the Y-12 plant. The sites are approximately 20 ft x 50 ft and 15 ft x 20 ft. The basement is within a structurally sound building, but the area is subject to flooding during sustained heavy rains and hence has the potential for spreading contamination to other areas exists. The ground is slightly alpha contaminated with average values of 2000 dpm/100 cm^2 and no measurable beta (<1 mR/h). Isolated spots may read as high as 30,000 dpm/100 cm^2. The soil is estimated to be contaminated to a depth of six to eight inches.

25.2 Decommissioning Alternatives

The following decommissioning alternatives have been identified for this facility, and are described below:

a. Protective Storage
b. Entombment
c. Excavation/Disposal
d. Covering
e. Decontamination

a. Protective Storage. This alternative involves placing the area into protective storage by fencing the area to minimize human intrusion, and providing appropriate warning signs to indicate the hazards within the fenced area. Appropriate entrance procedures would be developed, such as requiring protective clothing, should access to the area be required. In addition, dikes would be constructed to prevent flooding thus controlling the migration of contaminates through leaching. Routine monitoring of the area would be conducted to detect migration of contamination from the site.

b. Entombment. This alternative involves placing the contaminated soil in strong, tight containers and storing them in the crawl space. Routine monitoring of the area would be conducted to detect any leakage of contamination from the containers. The resulting excavation would be regraded.

c. Excavation/Disposal. This alternative involves excavating, packaging, and transporting the contaminated soil for disposal in an approved waste disposal facility. A contamination control structure would be erected over the excavation for dust control and suppression. Laborers, wearing appropriate protective clothing, would manually excavate and package the contaminated soil. Portable showers would be installed on site for laborers to wash at the end of the day. The material would be transported manually from the basement to the outside, and then disposed in an approved waste disposal facility. The excavations would be smoothed, but not backfilled.

d. Covering. This alternative involves placing a protective cover over the contaminated areas. In this particular location, concrete would probably be preferable.

e. Decontamination. This alternative would be a combination of c and d above. The contaminated soil would be excavated and disposed. The excavation would be backfilled with clean material and graded.

26.1 Decontamination Facility (9419-1) Y-12

This facility is located in the southeast portion of the Y-12 complex in Building 9419-1. The site was primarily a steam-cleaning facility that was used to decontaminate equipment and materials associated with the development of molten salt reactor technology. The facility is very dirty, apparently due to many years of being used as a storage house with minimal maintenance. A gravity flow drain line connects the building to a concrete pit. The interior of the building is designated as a regulated zone and possibly contains low levels of alpha contamination which has not been confirmed by a recent survey.

26.2 Decommissioning Alternatives

The following decommissioning alternatives have been identified for this facility, and are described below:

a. Protective Storage
b. Dismantlement and Disposal

a. Protective Storage. This alternative involves clearing the outside of Building 9419-1 of loose equipment and materials, capping the drain line at the building intersect, and sealing the building to minimize human intrusion. Warning signs would be placed on the building entrances, and appropriate entrance procedures would be developed, such as requiring protective clothing, should access to the area be required. Routine monitoring of the area would be conducted to detect migration of contamination from the site.

b. Complete Disposal. This alternative involves the complete dismantlement of the building including the concrete pad. After a complete radiological survey, equipment inside the building would be segregated into clean and contaminated materials. The clean material would be disposed of in the contractor's landfill and the contaminated material packaged in approved containers and transported to an approved waste disposal facility. The building would be dismantled and disposed of in the contractor's landfill, if

uncontaminated. The concrete pad would be dismantled by conventional demolition techniques, such as backhoe mounted rams, rocksplitters, demolition compounds and sawing. The concrete would be disposed of in an appropriate waste disposal facility. The drain line to the concrete pit would be capped at the building intersection. The resulting void due to decommissioning activities would be filled with clean materials, graded and reseeded.

References

1. RCRA Facility Assessment ORNL/RAP-12
2. Surplus Contaminated Facilities Program Maintenance and Surveillance Plan FY 1987 - 1996
3. Facility Scoping Survey for the Surplus Contaminated Facilities Program

INTERNAL DISTRIBUTION

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