ORNL/RAP-29

ASSESSMENT OF MAINTENANCE AND SURVEILLANCE REQUIREMENTS FOR 26 ORNL SURPLUS CONTAMINATED FACILITIES

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PREPARED BY

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Prepared for the
Assistant Secretary for Energy Research

DOE Contract No. DE-AC05-87OR21706
Task Order No. ASI-003-87 Subtask 1

September, 1987

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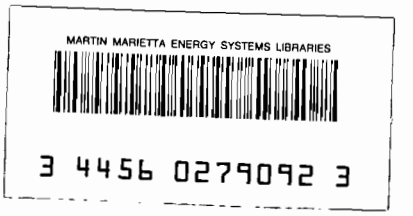
operated by
Martin Marietta Energy Systems, Inc.
for the
U.S. DEPARTMENT OF ENERGY
under Contract No. DE-AC05-84OR21400



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1.0 INTRODUCTION

As a matter of course, the nature of work conducted at the Oak Ridge National Laboratory (ORNL) results in certain facilities becoming surplus when experimental programs end. At times these facilities are contaminated and thus not readily reuseable. Such surplus, contaminated facilities must be maintained and monitored to ensure containment of radioactive and other hazardous materials, and to prevent or minimize hazards to site personnel and the public.

The ORNL Surplus, Contaminated Facilities Maintenance and Surveillance Plan (ORNL M&S Plan), FY-1987-1996 addresses 26 specific surplus, contaminated facilities. The M&S Plan was developed to maintain and monitor the 26 facilities.

Advanced Sciences, Inc. (ASI), has been contracted to review and assess the M&S Plan. This assessment is based upon ORNL facility scoping surveys, ORNL regulatory and guidance manuals, and the ASI experience in nuclear decontamination/decommissioning and waste management.

This report details the ASI assessment of the ORNL M&S Plan for 26 facilities. It is structured to group common recommendations. These common recommendations fall into three categories:

a. Recommend facility specific changes to the ORNL M&S Plan with corrective actions.
b. Recommend facility specific corrective actions without change to the ORNL M&S Plan.
c. Describe the facilities for which there are no recommended changes to the ORNL M&S Plan nor corrective actions.

Table 1.1 lists the 26 facilities examined and shows the results of the assessment. This table lists the facilities in the same order as presented in the ORNL M&S Plan.

Para No.	Facility/Location	ASSESSMENT M & S Plan No Change	Change	Corrective Action
4.1	Oil Storage Tank/Site 7860	X		
4.2	FPDL LLW Transfer Line/Bldg. 3517	X		
2.1	FPDL Filter Pit/NE of Bldg. 3517		X	X
4.3	LLW Tank, W1-A/Site 3023	X		
2.2	Decontamination Facility/Bldg. 7819		X	X
2.3	Storage Pad/SW of Bldg. 3503		X	X
3.1	Offgas Filter House/Bldg. 3121	X		X
2.4	Tower Shielding Facility Equipment/ Area 7700		X	X
3.2	High Level Chemical Development Laboratory/Bldg. 4507	X		X
3.3	High Level Radiation Analytical Laboratory/Bldg. 3019B	X		X
3.4	Remote Coating Furnace Loop/ Bldg. 4508, Room 265A	X		X
2.5	Ceramic Processing Laboratory/ Bldg. 4508, Room 139		X	X
4.4	Transuranium Research Laboratory/ Bldg. 5505, Room 45	X		
4.5	Co-60 Storage Garden/Bldg. 3029	X		
3.5	Sr-90 Power Generators/ Bldg. 3029, 3001	X		X
4.7	Filter House/Building 3110 and Isotope Ductwork	X		
4.6	86" Cyclotron/Bldg. 9201-2	X		
3.6	Pu Process Condensate Tank/ Bldg. 9720-8	X		X
2.6	Pu Processing Facility/ Bldg. 9204-3, Room 116		X	X
4.8	Cm Handling Glovebox/ Building 9204-3, 2nd floor	X		
4.9	MSRE Fuel Handling Facility/ Bldg. 9201-3, Room 235	X		
3.7	Coolant Salt Technology Facility Bldg. 9201-3, 2nd floor	X		X
4.10	Storage Tank/Bldg. 9201-3 Mezzanine above Room 126	X		
3.8	Attic/Bldg. 9204-1	X		X
3.10	East End Basement/Bldg. 9204-1	X		X
3.9	Decontamination Facility Bldg. 9419-1	X		X

Table 1.1

2.0 RECOMMENDED PLAN CHANGES

This section includes facility specific recommendations to modify the ORNL Maintenance and Surveillance Plan (ORNL M&S Plan). After a comprehensive review of the M&S Plan and other documents, site inspections, and interviews with site personnel, it was concluded that the M&S Plan was very thorough, and required few changes.

Of the 26 facilities addressed by the M&S Plan, 20 require no change. This section recommends additions to the M&S activities for 6 facilities.

The following descriptions of these six facilities are of the recommended M&S Plan additions and the corrective actions recommended for each facility.

2.1 FPDL Filter Pit (NE of Building 3517)

The filter pit and associated components (i.e. bypass duct and above ground HEPA filter housing) are within the security area of the X-10 site. The area is posted per ORNL Radiation Protection Procedure 2.7. However, the containment of radioactivity and soil contamination is questionable at this time.

2.1.1 Maintenance and Surveillance Plan Recommendations

In view of the unknown soil contamination source or extent, it is recommended that the migration of the contaminants be monitored. It is also recommended that a third activity be added to Table 1; downgradient ground water monitoring semi-annually.

2.1.2 Recommended Corrective Action

a. Although the area is posted with radiation/contamination zone signs, there appears to be a possibility of casual exposure to personnel

from the above ground filter house and the contaminated soil. To meet the as low as reasonably achievable (ALARA) intent of the ORNL Radiation Protection Procedures Health Physics (RPPHP) Manual, Section 3.2 and 6.1, it is recommended that a physical barrier be established around this area, in addition to the existing signs.

b. To comply with Section 2.5 of the ORNL RPPHP Manual, Radioactive Contamination Control, it is recommended that a temporary cap be placed over the contaminated soil areas NE of the filter pit to minimize soil leaching.

2.2 Decontamination Facility (Building 7819)

The interior of this facility was not inspected at this time, but the latest survey results show significant levels of loose, smearable contamination throughout the building, and dose rates of 20 mR/hr. The sand blasting decontamination operations left a pile of contaminated sand located behind the building at the edge of a wooded area. This facility is posted per ORNL RPPHP Manual. After an inspection of the exterior portion of the facility, several recommendations are offered.

2.2.1 Maintenance and Surveillance Plan Recommendations

In view of the exposure of the contaminated sand and soil to the weather, it is recommended that the migration of the contaminants be monitored. It is recommended that an additional surveillance activity be added to Table 1; namely, a perimeter radiation survey, semi-annually.

2.2.2 Recommended Corrective Action

To comply with Procedure 2.5 of the ORNL RPPHP Manual, Radioactive Contamination Control, the following recommendations are submitted:

a. To prevent local wild life and weather from spreading the contamination in the sand, it is recommended that a temporary cover be placed over the sand.

b. It is recommended that the contaminated equipment presently stored outside the building be relocated to a sheltered area.

C. As a further enhancement of contamination control, it is recommended that scheduled housekeeping work be implemented at this facility.

2.3 Storage Pad (Southwest of Building 3503)

This concrete pad is located within the secured area of the X-10 site, is routinely inspected and has a roped off radiation/contamination area along the west portion and is covered by a roof.

2.3.1 Maintenance and Surveillance Plan Recommendations

Due to the unknown extent of soil contamination to the west of the pad, it is recommended that the surveillance activities for this facility, Table 1, be expanded to include a semi-annual perimeter radiation survey.

2.3.2 Recommended Corrective Action

a. To satisfy the intent of the ORNL RPPHP Manual, Section 6.1, it is recommended that the contaminated soil area be roped off with a yellow/magenta rope.

b. To comply with Section 2.5 of the ORNL RPPHP Manual, it is recommended that the contaminated soil area be defined and temporarily covered to prevent the spread of the contamination.

2.4 Tower Shielding Facility Equipment (Area 7700)

This facility is located in a remote area of the Oak Ridge reservation. The facility is surrounded by a fence and the entrance is continuously manned by a security guard. A small work force man this facility on a daily basis and enter the storage area infrequently in the course of normal activity. The area is posted per ORNL Radiation Protection Procedures.

2.4.1 Maintenance and Surveillance Recommendations

In view of the potential chemical hazard associated with stored sodium, it is recommended that the frequency of surveillance be increased to a monthly basis rather than a quarterly basis.

2.4.2 Recommended Corrective Action

a. It is recommended that the depleted uranium be relocated to inhibit deterioration, from weathering, of the container.

b. The sodium container is maintained at a negative pressure, and its integrity is questionable. Should the seal of this container leak, humid outside air would enter the container and the consequent sodium-water reaction may occur. It is recommended that the sodium be covered in these containers with a non-reactive hydrocarbon, such as kerosene, at atmospheric pressure.

c. It is recommended that the material in the scrap yard be characterized and segregated into uncontaminated and contaminated material. Furthermore, it is recommended that the contaminated material be covered from the weather and zoned as a contaminated area.

2.5 Ceramic Processing Laboratory (4508)

Located in Building 4508, Room 139 of the X-10 complex, this facility is currently active and is used intermittently. The facility consists of a suite of laboratories which have been marked as a contamination zone, while other areas within the complex are not contaminated and are used on a daily basis. A barrier is set up at the entrance to the contamination zone with shoe covers, lab coats, and detection equipment available for use upon entering the area.

2.5.1 Maintenance and Surveillance Plan Recommendations

Because of the possibility of graphite dust in the existing duct work, a filter monitoring program should be implemented. It is recommended that this be added as an activity to Table 1.

2.5.2 Recommended Corrective Action

Hoods containing residual contamination should be marked with appropriate identification.

2.6 Plutonium Processing Facility (Building 9204-3, Room 116, ORNL Y-12)

The plutonium processing facility is located in an area where personnel frequently pass. Workers perform daily tasks in the area adjacent to this facility. The facility is classified as a "control zone," it is locked and is properly barricaded. Personnel access into the facility is controlled. Radiological surveys are performed periodically to monitor radiation levels and to identify potential contamination spreads. The integrity of the facility is sound; however, there are reports that the floor areas adjacent to the facility flood during heavy rains.

2.6.1 Recommended Maintenance and Surveillance Plan changes

In view of the existence of loose contamination, it is recommended that the negative pressure be monitored weekly.

2.6.2 Recommended Corrective Action

a. Personnel interviews indicate that flooding of the floor areas adjacent to the facility occurs during heavy rains. The possibility of flooding the facility floor is high. It is recommended that a dike be erected around the exterior of the facility to prevent water intrusion. The dike size could be four inches wide, four inches high, and would surround the facility. The materials to make the dike could be concrete, plastic, or other suitable material.

b. To reduce the potential of spreading the loose contamination, it is recommended that the surfaces of this facility be coated with a temporary fixative. Spraying a strippable coating would be recommended.

3.0 RECOMMENDED CORRECTIVE ACTION ONLY

This section includes descriptions of 10 of the 26 surplus contaminated facilities reviewed. As with those facilities described in Section 2, a comprehensive review of the ORNL M&S Plan and other documents were completed, site personnel were interviewed, and the facilities were inspected. This review and inspection concluded that the requirements specified in the ORNL M&S Plan were completely satisfactory. However, it did reveal some requirements for corrective action to conform with the intent of various other ORNL manuals.

3.1 Offgas Filter House (Building 3121)

This facility is located within the X-10 security controlled area, with further protection offered by the exclusion barrier of the Building 3019 complex. Surveillance is conducted by building personnel and the filter house is posted with the access requirements per Radiation Protection Procedures 2.3, 2.5, 2.7, 3.1, and 6.1.

3.1.1 Recommended Corrective Action

The 24-inch ventilation duct from Building 3019 is not posted regarding its internal radiation hazards. It is recommended that it be correctly posted per Section 2.3 of the ORNL Radiation Protection Procedures Health Physics (RPPHP) Manual.

3.2 High Level Chemical Development Laboratory (Building 4507)

The building that housed the laboratory is located within the secured area at the ORNL X-10 site and is inactive, unoccupied, and locked. Ventilation and radiation monitoring equipment are in continuous operation. The laboratory is divided into four major areas: Cell operating floor, hot cell areas (4),

changing area, and penthouse. Of these four areas, only the hot cells (4) and the penthouse are retained as a c-zone. The building entrances are posted as required by Radiation Protection Procedure 2.7 and require a representative from the Chemical Technology Division to gain access.

3.2.1 Recommended Corrective Action

Although the ORNL M&S Plan is adequate at this time, it is recommended that the housekeeping aspect of maintenance be increased. As an example, there are used, discarded booties laying indiscriminately on the floor; paint flaking appears rather widespread; and there were no apparent "clean" and "contaminated" waste containers at the area exit.

3.3 High Level Radiation Analytical Laboratory (Building 3019B)

Located in Building 3019B of the X-10 complex, this facility is currently unoccupied, except during maintenance and surveillance activities. Routine inspections are done weekly, radiological surveys are done monthly, or as required, and routine maintenance activities are performed as required - quarterly or annually. The laboratory is posted with respect to access restrictions and radiation/contamination zones.

3.3.1 Recommended Corrective Action

a. It is recommended that the potential hazards associated with the deterioration of the hot cell view ports be eliminated. It is recommended that the zinc-bromide view ports be drained and covered with an equivalent opaque shield material.

3.4 Remote Coating Furnace Loop

Located in Building 4508, Room 265A of the X-10 complex, this facility is inactive but is located in an active laboratory complex. The equipment, enclosed behind a plexiglass enclosure, is in good condition, as are the controls which are adjacent to the enclosure. The area is posted with respect to access restrictions and contamination/radiation zones. Routine inspection is performed monthly, radiological surveillance is performed quarterly, and routine maintenance is performed as required.

3.4.1 Recommended Corrective Action

a. The seal around the plexiglass door entering the enclosure appears old and loose. Repairing or replacing the seal is recommended.

b. The radiation hazards posted at the enclosure entrance and on the contaminated equipment located outside the enclosure were not obviously clear. It is recommended that these areas be more clearly marked.

3.5 Strontium-90 Power Generators

These items are located in the outdoor storage area east of Building 3029 and in Building 3001 within the X-10 complex, this facility consists of four surplus generators, all in good condition with no visible signs of damage or deterioration. No transferable contamination is detectable on their surfaces and there is no chemical hazard present. Routine inspection is performed monthly and a radiological surveillance is performed semiannually.

3.5.1 Recommended Corrective Actions

a. It is recommended that a permanent storage location be designated for the three generators instead of the present uncontrolled storage.

b. These items should be tagged per Radiation Protection Procedure (RPP) 2.3.

3.6 Plutonium Processing Condensate Tank

Located in the storage yard south of Building 9720-8 inside the Y-12 complex, this tank is inactive but is located in an area which is periodically accessed. The tank is in sound condition with no obvious signs of corrosion or degradation. It is properly tagged with respect to contamination/radiation hazards. Semiannual routine inspections and radiological surveys are performed.

3.6.1 Recommended Corrective Action

It is recommended that the plastic bag on the tank drain valve be replaced. The present bag is approximately half full of water and would result in a radioactive spill if it was ruptured.

3.7 Coolant Salt Technology Facility (Building 9201-3, ORNL Y-12

This facility is located in Building 9201 where personnel frequently pass on a daily basis. The surrounding area where the facility is located is not considered a radiological control zone. The integrity of the facility and its interior equipment are believed to be sound. There is some internally contaminated piping within the facility. The piping and pipe components are highly contaminated on the interior. Radiation levels exceed 40,000 dpm/100cm^2 alpha. The facility and exterior piping is radiologically posted in accord with RPP Manual, Procedure 2.3.

3.7.1 Recommended Corrective Actions

a. The highly contaminated piping has been blanked off on the side of the facility where there are no warning signs. It is recommended that these pipe stubs be tagged per RPP 2.3 describing the radiation hazard.

b. In this high traffic area, motorized equipment, such as a fork lift, could accidentally open the system. To eliminate this potential hazard, it is recommended that structural barricades, with appropriate warning signs, be erected around this facility.

3.8 Attic (Building 9204-1), ORNL, Y-12

This facility is located in the north-east section of Building 9204-1 of the Y-12 facility. It is located directly above an active office area. Few personnel enter the attic and normally do so only during times of maintenance.

The attic and its surrounds are in good condition. The overhead portion of the attic is contaminated with low levels of radiation. The contamination has been "fixed" in place by paint. However, the paint is peeling in places, allowing paint flakes containing radioactive contaminants to fall onto the upper side of the ceiling below.

The paint flakes fall to a false ceiling. This ceiling is sound, and from visual examination it appears to be sealed from the office space below. Directly below this false ceiling is a second ceiling that serves as an insulation and decorative ceiling for the offices beneath. This second ceiling further serves as a secondary backup system in the event the first or false ceiling fails to contain the contaminated paint flakes.

The general area is well posted with the appropriate radioactive barriers and placards.

3.8.1 Recommended Correction Actions

To minimize the possibility of contaminating the office space below, it is recommended that the attic surfaces be vacuumed.

3.9 Decontamination Facility (Building 9419-1, ORNL Y-12)

This facility is an independent building located away from ongoing daily work. Personnel access into the decontamination facility is restricted. The facility contains pieces of surplus equipment. Maintenance personnel enter the facility infrequently. This facility is believed to be structurally sound and radiation levels are low. The facility is radiologically identified and appropriate signs are posted.

3.9.1 Recommended Corrective Actions

a. At the time of the ASI inspection recent radiological survey data showed no significant contamination. However it is possible that some radioactivity may be covered by the heavy accumulation of dust and dirt. It is recommended that this facility be cleaned and re-surveyed.

3.10 East End Basement (Building 9204-1, ORNL Y-12)

This facility is located in the basement of Building 9204-1 and is remote from personnel traffic. The basement is used infrequently for maintenance and storage. The contaminated areas are located off to the side of the walk-way and are sometimes used for access to the overhead plumbing. The general area of the basement is well identified radiologically, and is properly barricaded and placarded. The integrity of the basement is sound.

3.10.1 Recommended Corrective Action

The contaminated soil areas are subject to flooding during sustained heavy rains. Since the nuclides in this contaminated soil are unknown, a potential hazard exists of spreading unknown radioactivity to other areas. It is recommended that the source of water intrusion be identified and sealed, dikes be constructed around the contaminated soil areas, or contaminated soil removed.

4.0 REVIEW WITH NO RECOMMENDED ACTION

This section describes 10 facilities which require no further comment. The ORNL Maintenance and Surveillance Plan thoroughly covers the maintenance and surveillance of these facilities. Inspection of these facilities and interviews with site personnel disclosed no need for immediate corrective action.

4.1 Oil Storage Tank Site 7860 NHF

This tank is in a restricted access area and the surrounding facilities are posted with respect to radiation hazards. The tank is constructed of mild steel, has the capacity for 4,000 gallons, and rests on a concrete pad. The entire structure is below grade with three pipes extending to the surface. It is located on an upslope south of the main hydrofracture building. It is currently full with a mixture of oil and water, and estimated to contain about 5 uCi/gal; approximately 20 mCi total. This estimate is approximate since the nuclides present are unknown.

4.2 FPDL Low Level Waste (LLW) Transfer Line (Building 3517)

This 1.5 inch stainless steel line has been removed from service and replaced by a two inch double wall line. At the present time, the line is in sound physical condition, contamination and radiation exposure is contained with no undue hazard to site personnel. This line is located within the secured area of the X-10 site, underground, and is posted per ORNL RPP 2.7 and covered by routine radiation surveys for detection of possible problems.

4.3 Low-Level Waste Collection Tank W1-A (Site 3023)

This tank has restricted access due to the underground location, and is located within the security area of the X-10 site, and the area is posted with access restrictions and radiation/ contamination zones. In addition to these restrictions, this tank is inactive and under daily surveillance to monitor level changes. W1-A Tank is in Group I of the Sampling Priority List (Task Order #ASI-004-87) which is also in progress at this time. Work is in progress to redirect surface water run-off away from the drain lines upstream of the tank due to suspected leakage into the tank.

4.4 Transuranium Research Laboratory 45

Located in Building 5505, Room 45 within the X-10 complex, this facility is inactive and used for equipment storage. The facility is in good condition and receives periodic inspection and radiological surveys. The facility is posted with respect to access restrictions and contamination/radiation zones. Routine inspections are performed periodically, radiological surveys are performed monthly or as required, and maintenance is performed as required.

4.5 Cobalt-60 Storage Garden

Located in Building 3029 within the X-10 complex, this facility is currently inactive but is located in the cell charging area of an active isotope production facility. The cobalt is adequately contained in a subterranean chamber and poses no significant radiological hazard and no chemical hazard. The facility is posted with respect to access restrictions and contamination/radiation zones. Site inspection showed no facility degradation or other potential problems. It is inspected visually each week, and radiologically on a monthly basis.

4.6 ORNL 86-inch Cyclotron

Located in Building 9201-2 within the Y-12 complex, this facility is inactive but located in an active building utilized by the Fusion Energy Division. The multilevel facility is in good condition and the safety systems have been maintained and are operational. There is very little transferable, external contamination, but the internals are contaminated with residual quantities of radionuclides. Oil used to cool electromagnets have less than 10 ppm PCB content. The facility is posted with respect to access restrictions and contamination/radiation zones. Weekly routine inspections are performed, monthly radiological surveys are performed, and maintenance is performed as required. There is some ground water leakage into the sump which is periodically pumped out.

4.7 Filter House (3110)/Isotopes Ductwork

This facility and its associated ductwork, located within the X-10 complex, is inactive and is sealed from active facilities and hot cells. It is maintained under a slight negative pressure by stack 3039 through controllable louvers. Considerable radioactivity remains in the roughing and HEPA filters, the inside of which are scheduled to be replaced in FY-87. No significant chemical hazards exist. Accessible areas of the system are posted with respect to access restrictions and radiation/contamination zones. Monthly routine inspection is performed and radiological surveys are done as required. Although the ductwork is highly contaminated, it is underground, inspected monthly, and poses no large threat if left undisturbed.

4.8 Curium Handling Glove Box (Building 9204-3), ORNL Y-12

The "curium handling glovebox" is located in an area where personnel work daily. The room where the glovebox is located is well monitored by health and safety personnel making frequent radiological background checks, taking smear

samples of the complete area, and continuously monitoring the breathing air to ensure that radioactive contamination does not spread and become airborne. The glovebox is in a stand-by status, and is not being used. The integrity of the glovebox is sound. The building, work location, and all immediate areas are well identified and posted accordingly.

This is a small glovebox, 3 ft by 5 ft, is in good condition, maintained under negative pressure, and located in a contaminated operating area which provides secondary containment. This operating area is contaminated with Plutonium and monitored with a continuous air monitor. The interior of the glovebox is significantly alpha-contaminated with transferable levels greater than 5×10^5 dpm/100 cm^2. The exterior of the glovebox is also contaminated due to its location, but only to a level of 5,000 dpm/100 cm^2. Direct radiation measured on the outside is less than 2 mR/h. There are no known chemical hazards. The glovebox is inspected weekly and surveyed radiologically every three months.

4.9 Molten Salt Reactor Experiment (MSRE) Fuel Handling Facility (Building 9201-3), ORNL Y-12

The MSRE Fuel Handling Facility is located in a building where personnel conduct ongoing daily work. The facility itself is barricaded, locked to prevent unauthorized personnel access, and is properly identified utilizing health and safety warning decals and placards. These decals and placards alert personnel to potential hazards in the event incidental access is considered. The integrity of the facility and its equipment is sound. Inspection of this facility and discussions with site personnel disclosed no potential hazards requiring immediate attention.

4.10 Storage Tank (Building 9201-3), ORNL Y-12

This facility is located on a mezzanine in a remote area of the building. Casual personnel access to this facility is unlikely since it is necessary to

climb a ladder to enter the tank area. The room where the tank is located is designated as a radiological control-zone. The tank and the general area surrounding it are properly identified by use of the appropriate radiation signs, decals, and placards. The tank is externally contaminated and this has been fixed by paint. The radiation levels are low. Both tank and storage area are in good condition. The integrity of the tank is sound. Examination of this facility disclosed no apparent hazards requiring immediate attention.

5.0 REFERENCES

The following documents were reviewed during the assessment of the ORNL M&S Plan, and in evaluating the need for certain corrective actions.

ORNL Quality Assurance Manual
ORNL Health Physics Manual
ORNL Safety Manual
ORNL EP Manual
ORNL Industrial Hygiene Manual
ORNL Facility Scoping Survey
RCRA Facilities Assessment (RFA), ORNL/RAP-12 V2
Applicable CFR Chapters
DOE Orders 5480.14 Series
RCRA Maps, ORNL RAP-12 V2
ORNL/RAP-2 Draft Remedial Investigation Plan for SWSA 6

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