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ORNL/ER-351

ENVIRONMENTAL RESTORATION PROGRAM

High-Ranking Facilities Deactivation Project Surveillance and Maintenance Work Plan

ENERGY SYSTEMS ER

MANAGED BY
LOCKHEED MARTIN ENERGY SYSTEMS, INC.
FOR THE UNITED STATES
DEPARTMENT OF ENERGY

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Energy Systems Environmental Restoration Program

High-Ranking Facilities Deactivation Project Surveillance and Maintenance Work Plan

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OAK RIDGE NATIONAL LABORATORY
Oak Ridge, Tennessee 37831-8169
managed by
LOCKHEED MARTIN ENERGY SYSTEMS, INC.
for the
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MARTIN MARIETTA

MARTIN MARIETTA ENERGY SYSTEMS, INC.

POST OFFICE BOX 2003
OAK RIDGE, TENNESSEE 37831

January 12, 1996

Mr. Charles T. Williams
Program Manager
DOE Oak Ridge Operations
IRC, MS-EW913
Oak Ridge, Tennessee 37831

Dear Mr. Williams:

Transmittal of *High-Ranking Facilities Deactivation Project Surveillance and Maintenance Work Plan*, ORNL/ER-351

Enclosed is a copy of the *High-Ranking Facilities Deactivation Project Surveillance and Maintenance Work Plan*, ORNL/ER-351. The attached document summarizes the surveillance and maintenance activities and their frequencies planned for the HRFDP facilities in fiscal year 1996.

Sincerely,

K. Constant, Manager
High-Ranking Facilities Deactivation Project

KC:bsw

Attachment

cc: L. V. Ashland
D. M. Matteo
J. R. Lyons
P. T. Owens
L. D. Owens
P. A. Schrandt
W. C. Stone
ORNL Laboratory Records
Central Research Library
ER Document Management Center (4)
HRFDP Team (5)
V. L. Boston, DOE-ORO
C. T. Williams, DOE-ORO

PREFACE

The High-Ranking Facilities Deactivation Project (HRFDP) Draft Surveillance and Maintenance (S&M) Plan was developed for high risk ranking facilities transitioned in fiscal year 1996. This work was performed under Work Breakdown Structure 1.6.6.2.10.1 (Activity Data Sheet 6502-OR "ORNL Nuclear Energy Facilities"). The objective of this effort will be to reduce overall costs, maintenance, and risks. This project will be managed by Lockheed Martin Energy Systems ER Division for the Department of Energy (DOE) Nuclear Material and Facility Stabilization Program (EM-60). This document was requested by the DOE Oak Ridge Operations (ORO) EM-60 Program Manager and DOE Headquarters EM-60. The HRFDP document is dynamic in nature and strives to reduce life cycle S&M cost and risk while effectively managing uncertainty and risk inherent in aging surplus facilities.

CONTENTS

TABLES

ABBREVIATIONS

BSF	Bulk Shielding Facility
BSR	Bulk Shielding Reactor
CAM	Continuous Air Monitor
CTD	Chemical Technology Division
DOE	United States Department of Energy
EM-60	DOE Nuclear Material and Facility Stabilization Program
ER	Environmental Restoration
FAB	Facility Authorization Basis
FRMS	Facility Radiation and Monitoring System
HRFDP	High-Ranking Facilities Deactivation Project
I&C	ORNL Instrumentation and Control Division
ORNL	Oak Ridge National Laboratory
ORP	ORNL Office of Radiation Protection
P&E	ORNL Plant and Equipment Division
PCA	Pool Critical Assembly
PM	Programmed Maintenance
ORO	DOE Oak Ridge Operations
ORP	ORNL Office of Radiation Protection
RPSD	ORNL Robotics and Process Systems Division
RRD	Research Reactors Division
S&M	Surveillance and Maintenance
SFIA	Surplus Facilities Inventory Assessment
TSF	Tower Shielding Facility

EXECUTIVE SUMMARY

The High-Ranking Facilities Deactivation Project (HRFDP) provides surveillance and maintenance (S&M) for four high risk ranking primary facilities at the Oak Ridge National Laboratory (ORNL) and their 28 associated ancillary facilities. The objectives of the S&M activities are to (1) ensure adequate containment of residual radioactive materials remaining in the facilities, (2) provide safety and security controls to minimize the potential hazards to on-site personnel and the general public, and (3) manage the facilities in the most cost-effective manner while awaiting decommissioning.

1. INTRODUCTION

The High-Ranking Facilities Deactivation Project (HRFDP) was created in 1995 to manage the high-risk ranking surplus facilities at Oak Ridge National Laboratory (ORNL), identified through the Surplus Facility Inventory Assessment (SFIA). These facilities include the Bulk Shielding Facility (BSF) along with its 16 associated ancillary facilities, the Tower Shielding Facility (TSF) along with its 12 associated ancillary facilities, the High Radiation Level Analytical Facility, and the Integrated Process Demonstration Facility. The building names and numbers of these 32 facilities are presented in Table 1.1. The mission of the HRFDP is to stabilize these facilities and minimize the cost of the surveillance and maintenance (S&M) required to maintain the safety envelopes of these facilities. The HRFDP will monitor the implementation of the S&M activities through the HRFDP S&M database.

The purpose of the HRFDP S&M Work Plan is to describe the maintenance and surveillance program applicable to the HRFDP facilities during permanent shutdown. This plan addresses the structure, system, and component maintenance that is directly related to the programmatic functions of the buildings. Activities covered by laboratory overhead, such as fire protection and security, are not included in this plan.

Table 1.1. High-Ranking Facilities Deactivation Project facilities

Building name	Number	Building name	Number
Bulk Shielding Facility*	**3010**	Liquid Helium Tank	13822
Water Demineralizer	3004	**Tower Shielding Facility***	**7700**
Caustic Tank	3004A	Big Beam Shield	7700A
Caustic Tank	3004B	Outside Source Storage Area	7700B
Caustic Tank	3004C	TSF Handling Pool	7701
Nitric Acid Tank	3004D	Control House	7702
Nitric Acid Tank	3004F	Hoist House	7703
Nitric Acid Tank	3004H	Control House #2	7704
BSR Pumphouse	3009	TSF Pumphouse	7705
Storage BSR	3088	TSF Cooler	7706
Filter Facility BSR	3098	Battery House	7707
Storage Shed	3101	Shielding Storage Facility	7708
Cooling Tower	3117	Filter House	7716
Sulfuric Acid Tank	3117A	Civil Defense Facility	7720
Heat Exchanger and Pumphouse	3119	**High Radiation Level Analytical Facility***	**3019B**
Liquid Nitrogen Tank	A-1204	**Integrated Process Demonstration Facility***	**7602**

*Denotes primary facility

2. BULK SHIELDING FACILITY

2.1 INTRODUCTION

The purpose of this section of the Maintenance Work Plan is to describe the maintenance and surveillance program applicable to the BSF and its ancillaries during permanent shutdown. This plan includes Buildings 3004, 3004A, 3004B, 3004C, 3004D, 3004F, 3004H, 3009, 3010, 3088, 3098, 3101, 3117, 3117A, 3119, A-1204, and 13822.

This plan addresses the structure, system, and component maintenance that is directly related to the function of the reactor buildings. Maintenance of associated infrastructure items such as roads and grounds, is within the purview of the Oak Ridge National Laboratory (ORNL) Plant and Equipment (P&E) Division.

Section 2.2 defines responsibilities and requirements for the routine, ongoing inspection program for reactor equipment; Section 2.3 lists items covered by the Research Reactors Division preventive maintenance program; and Section 2.4 describes the necessary surveillance performed by the facility management and the Office of Radiation Protection (ORP).

Administrative and organizational aspects of the BSF maintenance program are established in the *Research Reactors Division Maintenance Manual,* ORNL/RRD/INT-42, Volume 1. Reactor control systems surveillance and calibration procedures are documented in *BSF Instrument Calibration Procedures,* ORNL/RRD/INT-101.

The implementation of this workplan will provide, at minimal cost, the S&M to ensure integrity and containment of the 73 fuel elements, sources, heavy water, and the reactor pool coolant system. In addition, the plan ensures that site buildings and support systems remain structurally sound and operational until final disposition occurs.

2.2 INSPECTION PROGRAM

The following inspection and surveillance efforts are pursued routinely for building structures, systems, and components to ensure safe and reliable operation of the facility in a shutdown condition:

1. Equipment checks and calibrations are conducted at the reactor on regular intervals according to the descriptions in Section 2.3.

2. Inspections on pressure-containing equipment, hoisting equipment, and filters are performed to meet national codes and standards, as defined by the ORNL Office of Quality Programs and Inspection.

3. Lighting checks, repairs, and replacement are conducted by the Illumination Engineers (P&E Division) upon request.

4. Surveillance checks are performed in the BSF buildings to ensure integrity of the reactor pool and coolant system, operability of radiation monitors, and maintenance of building heating and ventilation. The surveillance checks are performed by the BSF operators on scheduled frequencies as documented in the *Shutdown Operating Manual for the Bulk Shielding Facility,* ORNL/RRD/INT-103.

2.3 PROGRAMMED MAINTENANCE

The reactor programmed maintenance effort provides for preventive maintenance to keep the facility and equipment in safe and reliable operating condition. This program at the ORNL reactors consists of the ORNL Plant and Equipment Division (P&E) and ORNL Instrumentation and Controls Division (I&C) programmed maintenance system.

2.3.1 P&E Programmed Maintenance

The P&E Programmed Maintenance (PM) plan ensures the availability, operability, and reliability of plant safety structures, systems and components. The procedures for generating, tracking, and changing the P&E PM list at the BSF are contained in the *RRD Maintenance Manual*, Procedure No. RRD-M-1.8.1, ORNL/RRD/INT-42/V1. An example of the current list used at the BSF is presented in Table 2.1.

Table 2.1. Plant and Equipment Division preventive maintenance at the Bulk Shielding Facility

P. M. number	Description	Frequency
	General maintenance	As required
3009-89100	Painting of structures (exterior)	Once every 5 years
3010-00001	3 continuous air monitors	Once every 4 months
3010-00095	Trane A/C Unit No. 4	Annually
3010-01001	Emergency exit and safety lights	Monthly
3010-01004	Bldg elect. Switchgear maintenance	Once every 4 years
3010-01015	Carrier A/C No. 7	Annually
3010-01020	BSR pool recirculating pump	Semiannually
3010-01045	Bridge trolley Detroit	Annually
3010-01050	Industrial 7-1/2-ton crane bay area	Annually
3010-01060	Door, swinging	Annually
3010-01065	Unit heaters	Once every 2 years
3010-01080	Valve, P.R. #175, S.W. corner, basement	Annually
3010-01110	Pump Allis-Chalmers SE of pool area	Quarterly
3010-01125	Reactor pool bridge, S. Unit	Once every 2 years
3010-01130	Reactor pool bridge, N. Unit	Once every 2 years
3010-01320	Fan exhaust E-side LTNIF annex	Once every 5 years
3010-01355	Trane A/C, Rm. 171, LTNIF	Annually
3010-02400	Yale, Hoist, 1/4 ton	Annually

Table 2.1 (continued)

P. M. number	Description	Frequency
3010-03420	Trane A/C Unit No. 1	Annually
3010-03430	Trane A/C Unit No. 2	Annually
3010-77030	Transformer, 750KVA, St. 2-3	Annually
3010-87100	Inspect floor tile	Annually
3010-88100	Maintenance of structures	Annually
3010-89100	Paint structures (exterior)	Once every 5 years
3010-90100	Maintenance of roofs	Annually
3010-91100	Paint interior of building	Once every 5 years
3098-89100	Painting of structures (exterior)	Once every 5 years
3042-0206026	Caterpillar aux. Diesel power unit	Once every 2 weeks
3042-0206038	Caterpillar Aux. diesel power unit	Once every 2 months
3117-00005	Bldg. elect. switchgear maintenance	Once every 4 years
3117-00020	Centrifugal pump north	Semiannually
3117-99085	Safety shower	Annually
3119-01005	Bldg. elect. switchgear maintenance	Once every 4 years
3119-01010	Crane steam heater	Once every 4 years
3119-01015	Dean Bros. booster pump	Once every 2 years
3119-01040	Electric control panel	Annually
3119-01050	Air control valve	Semiannually
3119-90100	Maintenance of roofs	Annually
3119-99110	Safety shower	Annually
Q/A-5857,8,9	HEPA filters - Bldg 3098	Semiannually

2.3.2 I&C Programmed Maintenance

The comparable procedures for generating, tracking, and changing the I&C PM list are contained in the *RRD Maintenance Manual*, Procedure No. RRD-M-1.8.3, ORNL/RRD/INT-42/V1. An example of the current list used at the BSF is provided in Tables 2.2 and 2.3. The items in Table 2.3 are required by the Facility Authorization Basis (FAB) documents and require a safety review before any changes are made.

Table 2.2. Bulk Shielding Facility Instrumentation and Control Division calibration and preventive maintenance on non-FAB required instrumentation

Service designation	Description	Frequency
RIM-NOG	Gamma monitor (Duct)	Semiannually
FR-25A & B	Recorder roll pneu	Semiannually
FS-25B	Switch pressure	Semiannually
FS-25A	Switch pressure	Semiannually
LS-4A	Switch pressure	Semiannually
LS-4B	Switch pressure	Semiannually
RIM-5A	Gamma monitor (outlet water)	Semiannually
RIM-5B	Gamma monitor (outlet water)	Semiannually
FT-25A	Xmitter DP pneu	Semiannually
FT-25B	Xmitter DP pneu	Semiannually
LS-5	Probe liquid level	Semiannually
FRMS	FRACAS	Semiannually
3004-PH	Meter pH	Semiannual Cal.; 1 mos PM
3004-RES	Meter resistivity	Semiannual Cal.; 1 mos PM
Log Gamma Hi	Electrometer log bay	Semiannually
LI-4A	Decay tank level	Semiannually
LT-4	Decay tank trans.	Semiannually
GAM PWR SUP	Gamma power supply	Semiannually
High Bay Mon	Rad high monitron	Semiannually

Table 2.3. Bulk Shielding Facility Instrumentation and Control Division Calibration and Preventive Maintenance Facility Authorized Basis Required Instrumentation

Instrument channel	Calibration frequency	Associated instrumentation by service designation
BSR PH	Semiannually 1 month PM	Meter pH (Bench)
BSR-RES	Semiannually 1 month PM	Meter Resistivity (Bench)
Monitor ACT	PM semiannually	Water Activity (Bench)
FRMS	Mon. & CAM prior to fuel move	FRACAS

2.4 BSF SURVEILLANCES

The BSF is shut down by directive of DOE. Both BSF reactors, the Bulk Shielding Reactor (BSR) and the Pool Critical Assembly (PCA) are inoperable. The BSR and PCA fuel grids contain 10 half-fuel elements; all remaining fuel is stored in underwater fuel racks. The licensing document for BSR and PCA operation were the technical specifications (ORNL/TM-6345 for the BSR and ORNL/TM-6344 for the PCA). The technical specifications were written for operating reactors and have not been revised to reflect the facility's current shutdown condition. During periods of extended shutdown, such as the present shutdown, the technical specifications permit the Section 2.4 surveillance requirements to be suspended. However, to ensure integrity of the fuel plates and the pool water system, the following surveillances are performed to provide assurance of safe storage of the fuel currently located in the pool.

2.4.1 Research Reactors Division Surveillances

The following surveillances are valid for the current shutdown condition:

Surveillance Specification 1 Pool Water Level
The level of the pool water shall be monitored once daily.

Surveillance Specification 2 Fuel Integrity
The radioactivity of the pool water shall be checked once weekly.

Surveillance Specification 3 Pool Water Quality
Pool pH and resistivity (conductivity) shall be measured once each work day.

Surveillance Specification 4 Facility Radiation Monitoring System (FRMS) Components
One monitron and one CAM shall be checked operable prior to any fuel movements in the pool.

2.4.2 Office of Radiation Protection Surveillances

The office of Radiation Protection performs surveillance activities at various frequencies to verify that all contamination is contained or remains contained by the building and poses no threat to the site personnel, the public, or the environment.

Radiological surveys are conducted to identify which areas in the building are safe to enter without protective clothing and which contain radioactive contamination. The radiological surveys are done in accordance with Radiation Protection Standard Operating Procedures, the Health Physics Procedures Manual, INPO 88-010, "Guidelines for Radiological Protection at Nuclear Power Stations," and 10 CFR Part 835 "Occupational Radiation Protection." The frequencies of the radiological surveillances, listed in Table 2.4, are found in procedure RRD-HP-4 Revision 5.

Table 2.4. Radiological surveys at the Bulk Shielding Facility

Building	Area/description	Frequency
3004	Radiation and Contamination Survey	Weekly
3004	Balance of Building Radiation and Contamination Survey	Quarterly
3010	Regulated and Contaminated Area Egress Point and Adjacent Area Survey	Daily
3010	Basement Radiation and Contamination Survey	Weekly
3010	Pool Area and Associated Rooms Radiation and Contamination Survey	Monthly
3010	Second Floor Radiation and Contamination Survey	Annually
3095	Radiation and Contamination Survey	Quarterly
3117	Cooling Towers and Associated Buildings Radiation and Contamination Survey	Annually
3119	Pump Room Contamination and Radiation Survey	Monthly
Outside	BSR Grounds Area Radiation and Contamination Survey including 3098	Annually

3. TOWER SHIELDING FACILITY

3.1 INTRODUCTION

The purpose of this section of the Maintenance Work Plan is to describe the maintenance and surveillance program applicable to the TSF and its associated ancillary facilities during permanent shutdown. This plan includes Buildings 7700, 7700A, 7700B, 7701, 7702, 7703, 7704, 7705, 7706, 7707, 7708, 7716, and 7720.

This plan addresses the structure, system, and component maintenance that is directly related to the function of the reactor buildings. Maintenance of associated infrastructure items such as roads and grounds is within the purview of the ORNL P&E Division.

Section 3.2 defines responsibilities and requirements for the routine inspection program for reactor equipment, Section 3.3 lists items covered by the RRD preventive maintenance program, and Section 3.4 describes the surveillance performed by the facility operator and the ORP.

Reactor control systems surveillance and calibrations are established in accordance with *Tower Shielding Facility System Calibration Procedures*, ORNL/RRD/INT-52. Administrative and organizational aspects of the TSF maintenance program are established in the *Research Reactors Division Maintenance Manual*, ORNL/RRD/INT-42, Volume 1.

The implementation of this workplan will provide, at minimal cost, the maintenance to ensure integrity of the fuel plates, integrity of the reactor cooling system, and ability to monitor the subcritical condition of the core. In addition, the plan ensures that site buildings and support systems remain structurally sound until final disposition.

Implementation of the plan provides a safe, environmentally secure environment during the time necessary to develop the plans and obtain required approvals to dispose of fuel elements, large and difficult-to-handle quantities of hazardous materials, activated materials, and accountable materials. Only the systems necessary to provide the protection noted above will be maintained in accordance with currently approved documentation.

The reactor instrumentation surveillance had been performed on a three-month frequency during operations. However, the technical specifications only require a six-month frequency, which will be implemented during shutdown. I&C surveillance will be limited to that necessary to maintain the reactor cooling system in a condition to prevent freezing of any part of the system, to maintain the quality of the water to prevent corrosion damage of the fuel plates, and to monitor the shutdown condition of the core. The reduction in the amount and frequency of instrument surveillance reduces the I&C labor requirements. P&E maintenance is limited to maintaining the buildings and the systems that ensure integrity of the fuel plates, protecting the reactor cooling system from freezing, and maintaining the equipment necessary for final reactor fuel removal.

3.2 INSPECTION PROGRAM

Inspection and surveillance efforts are performed on a routine, ongoing basis for building structures, systems, and components to ensure safe and reliable operation of the facility in a shutdown condition:

1. Equipment checks and calibrations are conducted at the reactor on regular intervals according to the descriptions in Section 3.3.

2. Inspections on pressure-containing equipment, hoisting equipment, and filters are performed to meet national codes and standards, as defined by the ORNL Office of Quality Programs and Inspection.

3. Lighting checks, repairs, and replacement are conducted by the electricians (P&E Division) upon request.

4. Surveillance checks are performed by the TSF operators on a scheduled frequency according to the checksheets in the *Operating Manual for the Tower Shielding Reactor-II,* ORNL/TM-9900. These checks are performed to ensure integrity of the fuel, integrity of the coolant system, and subcritical condition of the core.

3.3 PROGRAMMED MAINTENANCE

The reactor programmed maintenance effort provides for preventive maintenance to keep the facility and reactor equipment in safe and reliable operating condition. This program at the ORNL reactors consists of the P&E and I&C programmed maintenance.

3.3.1 P&E Programmed Maintenance

The P&E Programmed Maintenance PM plan ensures the availability, operability, and reliability of plant safety structures, systems, and components. The procedures for generating, tracking, and changing the P&E PM list at the TSF are contained in the *RRD Maintenance Manual*, Procedure No. RRD-M-1.8.1, ORNL/RRD/INT-42/V1. An example of the current list used at the TSF is provided in Table 3.1.

Table 3.1. Plant and Equipment Division preventive maintenance at the Tower Shielding Facility

PM number	Machine description	Frequency of PM
	General Maintenance	As Required
7700-00001	Tower Shielding Facility inspection	Annually
7700-00010	TSF lightning protection inspection	Annually
7700-00050	Big beam shutter	Semiannually
7700-00105	Valve TSF fire reservoir tank	Annually
7700-00500	TSF elec. oper. gate 600-ft fence	Annually
7700-00750	TSF elec. oper. gate 2 (600-ft fence)	Annually
7700-00900	Inspection of TSF fences	Annually
7700-01010	Forklift, gas	Semiannually
7700-01090	Cable guide rollers (12)	Annually
7700-01100	Cable idler sheaves (4)	Annually

Table 3.1 (continued)

PM number	Machine description	Frequency of PM
7700-01110	Ground hoist sheaves (6)	Annually
7700-01114	Condenser air-cooled carrier	Semiannually
7700-01115	Fan supply dryer dynamics	Semiannually
7700-01117	Condenser air-cooled carrier	Semiannually
7700-01120	Cable guide roller	Annually
7700-01123	Hoist for aircraft warning lights north	Annually
7700-01125	Otis TSF elevator	Every 3 and 12 months
7700-01130	Cable guide roller	Annually
7700-01135	Trane air-cooled condenser by ramp	Annually
7700-01150	Tower Shielding Facility leg No. 1	Annually
7710-01160	Tower Shielding Facility, hoist B	Annually
7700-01170	Tower Shielding Facility leg No. 4	Annually
7700-01180	Tower Shielding Facility leg No. 3	Annually
7700-01190	Tower Shielding Facility, hoist D	Annually
7700-01200	Tower Shielding Facility leg No. 2	Annually
7700-01205	Hoist for aircraft warning lights south	Annually
7700-01207	TSF anchor screws	Annually
7700-01215	Allis Chalmers demin. water cir. pump	Annually
7700-02030	Demineralized water tank equipment	Annually
7700-77157	Transformer 1, 167 KVA, sta. 234-23 PCB	Once every 2 years
7700-77158	Transformer 2, 167 KV2, sta. 234-23 PCB	Once every 2 years
7700-77159	Transformer 3, 167KVA, sta. 234-23 PCB	Once every 2 years
7700-87100	Inspect floor tile	Annually
7700-88100	Maintenance of structures	Annually
7700-89100	Painting of structures (exterior)	Once every 5 years
7702-01205	Fan supply dryer dynamics	Quarterly
7702-01210	Electrical distribution controls	Once every 4 years
7702-01215	Breaker, circuit, Westinghouse	Once every 4 years
7702-01220	Dayton air compressor	Quarterly

Table 3.1 (continued)

PM number	Machine description	Frequency of PM
7702-01230	Copelamatic freon–12 A/C compressor	Semiannually
7702-01240	Trane climate changer	Semiannually
7702-01250	Electrical distribution controls	Once every 4 years
7702-01260	Carrier Weathermaker A/C	Once every 6 months
7702-01280	Carrier Weathermaker A/C	Once every 6 months
7702-01300	Building exhaust damper	Once every 3 months
7703-01005	440 3-phase hoist disconnect switch	Annually
7703-01006	Hoist control circuit panel	Annually
7703-01010	Whiting hoist No. 1, 12,000-lbs ser. 7376	Annually
7703-01015	General Electric control unit No. 1	Annually
7703-01020	Whiting hoist B, 11,000-lbs ser. 7380	Annually
7703-01025	General Electric control unit B	Annually
7702-01030	Whiting hoist No. 4, 11,000-lbs ser. 7379	Annually
7703-01035	General Electric control unit No. 4	Annually
7703-01040	Positioning hoist elec. control panel	Annually
7703-01050	Whiting hoist No. 3, 11,000-lbs ser. 7381	Annually
7703-01055	General Electric control unit No. 3	Annually
7703-01060	Whiting hoist D, 11,000-lbs ser. 7378	Annually
7703-01065	General Electric control unit D	Annually
7703-01070	Whiting hoist No. 2, 12,000-lbs ser. 7377	Annually
7703-01075	General Electric control unit No. 2	Annually
7703-89100	Painting of structures (exterior)	Once every 5 years
7703-90100	Maintenance of roofs	Annually
7705-01290	GE exhaust fan	Semiannually
7705-01310	Nash-Hytor compressor	Semiannually
7705-01315	Dryer Trinity Heat-Les N-unit	Semiannually
7705-01320	Aurora pump–fill & pressure pump	Semiannually
7705-01325	Elec. transformers & control units	Once every 4 years
7705-01330	Aurora pump–shim pump	Semiannually

Table 3.1 (continued)

PM number	Machine description	Frequency of PM
7705-01340	Aurora pump–emergency pump	Semiannually
7705-01350	Aurora pump–main circulating pump	Semiannually
7705-01380	Cold water level control tank	Annually
7705-01390	Chromalox heater	Annually
7705-01400	Sliding hanger-type doors (2)	Once every 5 years
7705-01410	Aurora pump demineralizer unit	Annually
7705-01420	Chromalox heater	Annually
7705-89100	Painting of structures (exterior)	Once every 5 years
7705-90100	Maintenance of roofs	Annually
7705-99405	Safety shower	Monthly
7706-00500	Electrical switchgear units	Once every 4 years
7706-01480	Chromalox heaters (4)	Annually
7707-01100	Battery (72 each) TSF backup power sup. (specific gravity)	Quarterly
7707-01530	Chromalox heater and IGL exh. fan	Annually
7707-89100	Painting of structures (exterior)	Once every 5 years
7707-90100	Maintenance of roofs	Annually
7707-99400	Safety shower	Monthly
7708-90100	Maintenance of roofs	Annually

3.3.2 I&C Programmed Maintenance

The comparable procedures for generating, tracking, and changing the I&C PM list are contained in the *RRD Maintenance Manual*, Procedure No. RRD-M-1.8.3, ORNL/RRD/INT-42/V1. An example of the current list used at the TSF is given in Tables 3.2 and 3.3. The items in Table 3.3 require a safety review before any changes are made.

Table 3.2. Tower Shielding Facility Instrumentation and Controls Division calibration and preventive maintenance on non-FAB required instrumentation

Service designation	Description	Frequency
PT-137	Transmitter pressure (base press.)	Calibration every 24 months
PI-137A	Gauge Pressure (base press.)	Calibration every 24 months
PT-136	Transmitter pressure (main pump discharge)	Calibration every 24 months
PI-136A	Gauge Pressure (main pump discharge)	Calibration every 24 months
WD	Recorder anemograph	Preventive maintenance annually
RM-29	Electrometer log	Preventive maintenance annually
TR-1600	Recorder programmable	Calibration annually
RR-1000	Recorder programmable	Calibration annually
Air Temps	Recorder programmable	Calibration annually
FE-104	Meter digital (Turbine flow)	Calibration annually
FIC-102	Main flow controller	Calibration semiannually
PI-10A	Meter digital (shim press.)	Calibration annually
PE-10A	Transducer press	Calibration annually
PI-10C	Meter digital (core press.)	Calibration annually
PE-10C	Transducer press	Calibration annually
ACIM-128-1	Analyzer resistivity (demin.)	Calibration annually
ACIM-128-2	Analyzer resistivity (demin.)	Calibration annually
RM-11	Monitor safety trouble	Calibration semiannually
RM-13A	Pico-ammeter	Calibration semiannually
EM-13	Chamber ion comp supply	Calibration semiannually
RR-13	Recorder electronic (pico-ammeter)	Calibration semiannually
No. 1 Saf RE-1	Detector ion chamber	PM every 24 months
No. 2 Saf RE-2	Detector ion chamber	PM every 24 months
No. 3 Saf RE-3	Detector ion chamber	PM every 24 months
RE-12	Fission chamber	PM every 24 months
RE-13	Detector ion chamber (pico-ammeter)	PM every 24 months

Table 3.3. Tower Shielding Facility Instrumentation and Control Division calibration and preventive maintenance on Facility Authorization Basis required instrumentation

Instrument channel	Calibration frequency	Associated instrumentation by service designation	
Neutron counting rate channel	Semiannually	RM-12A	Linear Amplifier
		RT-12	Fission Preamplifier
		RQ-12	Scaler
		RM-12B	Log count-rate meter
		EM-12	Power supply fission HV
		RR-12B	Recorder electronic (Count Rate period)
		RR-12A	Recorder electronic (Count Rate)
Water radioactivity monitor	Semiannually	Water Act Mon Recorder Electronic	
		Modular Power Supply	
		Log/Lin Rate Meter	
		Linear Amplifier	
		Counter/timer	
		Indicator flow alarm	
Power level safety channels	Semiannually	RM-1, RM-2, RM-3,	Sigma amplifiers
		EM-6, EM-7, EM-8, EM-9	Magnet amplifiers
Reactor cooling water flow channel	Semiannually	FE-102, FT-102, FS-102, FR-102	
Core pressure drop channel	Semiannually	PdT-106, PdI-106, PdS-106	
Core delta temperature channels	Semiannually	TdE-160A, TdE-160B, TdT-160 (TdM-160), TdS-160, TdR-160	
		TdE-161A, TdE-161B, TdT-161 (TdM-161), TdS-161, TdR-161	
Heat exchanger exit water temperature	Semiannually	TT-163, TE-163, TS-163, TR-163	
Reactor inlet water temperature	Semiannually	TT-162 (TM-162), TE-162, TS-162, TR-162	
Monitor pH	Semiannually Monthly PM	Meter pH (bench)	
Monitor RES	Semiannually Monthly PM	Meter resistivity (bench)	
Monitor ACT	PM Semiannually	Water activity (bench)	

3.4 TSF SURVEILLANCES

The TSF is shut down in accordance with DOE directive. The Tower Shielding Reactor-II at the TSF is still fueled and in an operable condition. The licensing document for TSR-II operation was its technical specifications (ORNL/TM-4641). The technical specifications were written for an operating reactor and have not been revised to reflect the facility's current shutdown condition. During periods of extended shutdown, such as is presently occurring, the technical specifications permit the Section 3.4

surveillance requirements to be suspended. However, to ensure integrity of the fuel plates and the primary coolant system and to ensure the subcritical condition of the reactor, several surveillances are performed to provide assurance of safe storage of the TSR-II fuel.

3.4.1 Facility Operator Surveillances

The following surveillances are valid for the current shutdown condition:

Surveillance Specification 1 Reactor Measurement, Control and Safety Systems
Each measuring and safety channel shall be checked, tested and calibrated as indicated below in Table 3.4. These requirements are driven by the TSF technical specifications.

Table 3.4. TSF instrument channel checks

Instrument channel	Channel check	Channel test	Channel calibration
Neutron Counting Rate Channel	Weekly		Semiannually
Water Radioactivity Monitor	Weekly		Semiannually
Power Level Safety Channels		Weekly	Semiannually
Reactor Cooling Water Flow Channel	Weekly	Weekly	Semiannually
Core Pressure Drop Channel	Weekly	Weekly	Semiannually
Core Delta Temperature Channel	Weekly	Weekly	Semiannually
Heat Exchanger Exit Water Temperature	Weekly	Weekly	Semiannually
Reactor Inlet Water Temperature	Weekly	Weekly	Semiannually
Auxiliary Power Supply		Weekly	

Surveillance Specification 2 Reactor Cooling System
The pressure relief valves in the system shall be tested annually and after maintenance that could affect the pressure setting of the valves.

Surveillance Specification 3 Fuel Integrity
The radioactivity of the primary cooling water shall be checked weekly.

Surveillance Specification 4 Primary Water Quality
Primary pH and resistivity (conductivity) shall be measured weekly.

Surveillance Specification 5 Hoist Slack Line Protection Devices
The operation of the slack-line protection devices on hoists I and II shall be checked within one week of using hoists I and II to move the reactor.

Surveillance Specification 6 Hoist Load Test
Hoists I and II shall be load tested to applicable code requirements and within applicable code periodicities prior to using hoists I and II to move the reactor.

3.4.2 Office of Radiation Protection Surveillances

The office of Radiation Protection performs surveillance activities at various frequencies to verify that all contamination is contained or remains contained by the building, and poses no threat to the site personnel, the public, or the environment.

Radiological surveys are conducted to identify which areas in the building are safe to enter without protective clothing and which contain radioactive contamination. The radiological surveys are done in accordance with Radiation Protection Standard Operating Procedures, the Health Physics Procedures Manual, INPO 88-010, "Guidelines for Radiological Protection at Nuclear Power Stations," and 10 CFR Part 835 "Occupational Radiation Protection." The frequencies of the radiological surveillances, listed in Table 3.5, are found in procedure RRD-HP-4 Revision 5.

Table 3.5. Radiological surveys at the Tower Shielding Facility

Building	Area/description	Frequency
Outdoors	Outdoor Radiological Areas Radiation and Contamination Survey	Monthly
TSF Pad	Reactor Pad Radiation and Contamination Survey	Monthly
Outdoors	Grounds Radiation and Contamination Survey	Annually
7702	Control House Survey	Weekly
7703	Hoist Building Radiation and Contamination Survey	Annually
7704	Instrument Shop Survey	Weekly
7705	Pump House Radiation and Contamination Survey	Weekly
7706	Cooling Tower Contamination Survey	Annually
7707	7707 Battery House Contamination Survey	Annually
7708	7708 Building Radiation and Contamination Survey	Monthly
7716	7716 Filter Pump House Radiation and Contamination Survey	Annually
7720	Bunker Radiation and Contamination Survey	Semiannual

4. HIGH RADIATION LEVEL ANALYTICAL FACILITY

4.1 INTRODUCTION

The purpose of this section of the Maintenance Work Plan is to describe the maintenance and surveillance program applicable to the High Radiation Level Analytical Facility (Building 3019B) during permanent shutdown. This plan addresses the structure, system, and component maintenance that is directly related to the function of the facility. Maintenance of associated infrastructure items such as roads, grounds, and support structures is within the purview of the ORNL P&E Division.

Section 4.2 defines responsibilities and requirements for the building's equipment and systems routine inpection program, Section 4.3 lists items covered by the CTD preventive maintenance program, and Section 4.4 describes the necessary surveillance performed by the facility management and the ORP.

The implementation of this work plan will provide, at minimal cost, the surveillance and maintenance to ensure the integrity of the safety envelope of the facility. In addition, the plan ensures that site buildings and support systems remain structurally sound and operational until final disposition occurs.

4.2 INSPECTION

Inspection and surveillance efforts are performed routinely for building structures, systems, and components to ensure safe and reliable operation of the facility in a shutdown condition:

1. Equipment checks and calibrations are conducted at the facility on regular intervals according to the descriptions in Section 4.3.

2. Inspections on pressure-containing equipment, hoisting equipment, and filters are performed to meet national codes and standards, as defined by the ORNL Office of Quality Programs and Inspection.

3. Lighting checks, repairs, and replacement are conducted by P&E Division electricians upon request.

4. Surveillance checks are performed by the facility operators on a scheduled frequency. These checks are performed to maintain the building, ventilation system, and other systems necessary to maintain the containment of the radioactive contamination within the building.

4.3 PROGRAMMED MAINTENANCE

The facility programmed maintenance effort provides for preventive maintenance to keep the facility and building systems in safe and reliable condition. This program includes the P&E and I&C programmed maintenance system.

4.3.1 P&E Programmed Maintenance

The P&E Programmed Maintenance (PM) plan ensures the availability, operability, and reliability of plant safety structures, systems and components, and includes general maintenance and repair activities conducted as needed. An example of the current P&E activities performed at Building 3019B is presented in Table 4.1.

Table 4.1. P&E activities at Building 3019B

Description	Frequency of PM
Ventilation system maintenance (ducts, fans, etc.)	Monthly
HEPA filter inspection/replacement	Annually
Health Physics instrument maintenance	Annually
Maintenance of heating system	As required
HEPA filter replacement	As required
General maintenance and repair	As required

4.3.2 I&C Calibrations and Preventive Maintenance

Maintenance activities regularly performed by the I&C Division at Building 3019B are presented in Table 4.2.

Table 4.2. I&C activities at Building 3019B

Description	Frequency
Ventilation system maintenance	Monthly
I&C instrument calibration	Annually
Health Physics instrumentation calibration	Annually
Maintenance of heating system	As required

4.4 BUILDING 3019B SURVEILLANCE

Building 3019B is shutdown by directive of DOE. All hot cells in the facility are inoperable. To maintain the containment of the radioactive contamination within the building, the following surveillances and activities are performed.

4.4.1 Facility and Systems Surveillances

The following surveillances necessary under the current shutdown condition are presented in Table 4.3.

Table 4.3. Facility surveillances at Building 3019B

Description	Responsibility	Frequency
Housekeeping, Waste Management	Surveillance operators	Daily
Standby generator and diesel fuel tanks checks	Surveillance operators	Weekly
Facility walkdown	Facility manager	Weekly
Complete checklist for Emergency Generator Batteries	Surveillance operators	Weekly
Emergency lighting checks	Surveillance operators	Monthly
Ventilation system checks	Surveillance operators	Monthly
Alarm panel checks and tests	Surveillance operators	Monthly
Safety inspection	Surveillance operators	Quarterly
HEPA filter leak test	QE&I	Semiannually

4.4.2 Office of Radiation Protection Surveillances

The Office of Radiation Protection performs surveillance activities at various frequencies to verify that all contamination at the facility remains contained by the building, and poses no threat to site personnel, the public, or the environment. Activities performed by the ORP in Building 3019B and their frequencies are listed in Table 4.4.

Table 4.4. Office of Radiation Protection Activities at Building 3019B

Description	Frequency
Routine Surveys	Weekly
Smear Surveys	Monthly
Background Checks	Quarterly
Probe Survey	Annually
HEPA Filter Inspection	Annually
Preparation of Radiation Work Permits	As Required
S&M Support	As Required

5. INTEGRATED PROCESS DEMONSTRATION FACILITY

5.1 INTRODUCTION

The purpose of this section of the Maintenance Work Plan is to describe the surveillance and maintenance program applicable to the Integrated Process Demonstration Facility (Building 7602) during permanent shutdown. This plan addresses the structure, system, and component maintenance that is directly related to the function of the facility. Maintenance of associated infrastructure items such as roads and grounds is within the purview of the ORNL P&E Division.

Section 5.2 defines responsibilities and requirements for the routine inspection program for the building's equipment and systems, Section 5.3 lists items covered by the Robotics and Process Systems Division (RPSD) preventive maintenance program and Section 5.4 describes the necessary surveillance performed by the facility management and the ORP.

The implementation of this work plan will provide, at minimal cost, the S&M to ensure the integrity of the safety envelope of the facility. In addition, the plan ensures that site buildings and support systems remain structurally sound and operational until final disposition occurs.

5.2 INSPECTION

Inspection and surveillance efforts are performed on a routine, ongoing basis for building structures, systems, and components to ensure safe and reliable operation of the facility in a shutdown condition:

1. Equipment checks and calibrations are conducted at the facility on regular intervals according to the descriptions in Section 4.3.

2. Inspections on pressure-containing equipment, hoisting equipment, and filters are performed to meet national codes and standards, as defined by the ORNL Office of Quality Programs and Inspection.

3. Lighting checks, repairs, and replacement are conducted by P&E Division electricians upon request.

4. Surveillance checks are performed by the facility operators on a scheduled frequency. These checks are performed to maintain the building, ventilation system, and other systems necessary to maintain the containment of the radioactive contamination within the building.

5.3 PROGRAMMED MAINTENANCE

The facility programmed maintenance effort provides for preventive maintenance to keep the facility and building systems in safe and reliable condition. This program includes the P&E and I&C programmed maintenance system.

5.3.1 P&E Programmed Maintenance

The P&E Programmed Maintenance (PM) plan ensures the availability, operability, and reliability of plant safety structures, systems, and components. An example of the current P&E activities performed at Building 7602 is presented in Table 5.1.

Table 5.1. Plant and Equipment Division preventive maintenance at Building 7602

Description	Frequency
Safety Shower and Eye Wash Test	Monthly
Emergency Lighting Test	Semiannually
HEPA Filter Inspection	Annually
Heating System Maintenance	As required
General Preventive Maintenance	As required
HEPA Filter Replacement	As required

5.3.2 I&C Programmed Maintenance

Maintenance activities regularly performed by the I&C Division at Building 7602 are presented in Table 5.2.

Table 5.2. Instrumentation and Control Division maintenance and calibrations at Building 7602

Description	Frequency
Tank Level Meters Calibration for tanks 32F31 & 32F33	Annually
Health Physics Instrumentation Calibration, Maintenance, & Repair	As required

5.4 BUILDING 7602 SURVEILLANCE

Building 7602 is shutdown by directive of DOE. No programmatic work is currently being carried out in this facility. To maintain the containment of the depleted uranium contamination within the building, the following surveillances and activities are performed by the facility management and surveillance operators.

5.4.1 Robotics and Process Systems Demonstration Division Surveillances

The surveillances performed by the Robotics and Process Systems Division necessary under the current shutdown condition are presented in Table 5.3.

5.4.2 Office of Radiation Protection Surveillances

The surveillances listed in Table 5.4 are performed by Office of Radiation Protection personnel to verify that the depleted uranium contamination in the facility remains contained.

Table 5.3. Robotics and Process Systems Division surveillances performed in Building 7602

Description	Frequency
Visual Inspection of Building Exterior	Daily
Inspection of Building Interior & Process Areas	Twice per Week
Facility Ventilation System Inspection	Weekly
Level Check of Tank 32F31	Weekly
Level Check of Tank 32F33	Weekly
Overhead Crane Inspection	Monthly
Safety Shower & Eye Wash Inspection	Monthly
General Safety Inspection	Annually

Table 5.4. Radiological surveys in Building 7602

Description	Frequency
Health Physics Instrument Response Checks	Daily
Clean Area Surveys	Weekly
PCM and CAM Functional Tests	Weekly
PCM & CAM Performance Check	Monthly

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