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Deactivation Project Plan
Plutonium Fuel Form Facility
Building 235-F, Metallurgical Building

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Executive Summary

The purpose of the Department of Energy's (DOE's) 2012-1 Implementation Plan is to protect the maximally exposed off-site individual to within the established DOE-STD-3009 evaluation guidelines and protect the co-located and facility worker within the accepted Savannah River Site (SRS) guidelines of 100 rem. This objective is accomplished by reducing the likelihood and severity of a facility fire in conjunction with a reduction and/or immobilization of the residual radiological material in Building 235-F.

The 2012-1 Implementation Plan describes actions and deliverables that provide assurance that 1) transient combustibles are strictly controlled; 2) fixed combustibles are removed to the extent practicable; 3) reliability of the fire detection system is improved; and 4) ignition sources are minimized by air gapping and/or de-energizing electrical equipment throughout the building. A deactivation project has been established to remediate material-at-risk (MAR) in the Plutonium Fuel Form (PuFF) Facility cells/glove boxes and to manage the research and analytical activities addressing dose reduction for MAR located elsewhere in Building 235-F.

The planning and execution for a deactivation project is documented within a Deactivation Project Plan developed to satisfy Action 1-1 of the 2012-1 Implementation Plan. More detailed activity level planning will be documented in the work packages developed to execute the associated work scope. Due to the unknowns associated with the interior configuration and condition of some cells and due to the hazardous material involved, the Pu-238 removal and deactivation activities start with the less contaminated PuFF Facility Cells 6-9, and work towards the cells/glove boxes that contain the majority of the MAR (Cells 1 and 2 and their attached glove boxes). Performance of decontamination, deactivation, and enhanced characterization activities in the lower contamination levels present in Cells 6-9 will provide a safe and progressive learning environment for developing deactivation tooling and decontamination techniques. In practice, this means that the Project Team will first work in Cells 6-9, and then proceed to Cells 3-5 and their attached glove boxes. Upon the completion of work in Cells 3-5 and their attached glove boxes, the Project Team will conduct work in Cells 1-2 and their attached glove boxes.

Although the project has been planned on the basis of successful completion using low-tech proven tools and methods, the Project Team is actively evaluating alternate approaches and technologies that could increase project safety or contribute to more effective MAR removal. For example, several research and development possibilities are currently under review with the Savannah River National Laboratory (SRNL). These include the possible application of 3-D modeling and contamination mapping to MAR removal in the cells; the use of electrostatic decontamination systems to aid in MAR removal; a battery-powered portable vacuum that could be deployed inside the cells; and similar possibilities. These are in addition to the enhanced characterization development activities that are already an integral part of the Deactivation Project Plan. Discussions with colleagues, who have dealt with similar challenges such as the Alpha Reactor decommissioning job at Sellafield or hot-cell work at Oak Ridge, have been conducted, and will continue through the life of the deactivation project. The following is a summary level discussion of the scope of work planned for each fiscal year (FY) of the deactivation project.

In FY13, project activities are primarily aimed at developing a safety basis change that addresses deactivation activities in PuFF Facility Cells 3-9 and at restoring Cells 6-9 infrastructure systems, such as installing new glove cartridges into glove ports, installing lighting, and cleaning cell windows. Multiple layers of confinement protection will be in place to protect workers while restoring cell infrastructure. These are conceptually described in the following paragraphs.

Glove ports are designed to allow installation of a new glove cartridge without breaching cell confinement. Secondary confinement will be provided through use of a glove-bag or similar confinement when installing new gloves. Finally, workers will wear proper personal protection equipment (PPE) and supplied breathing air when working on glove ports.

Temporary lighting will be necessary, since electrical power will be removed in the near term to components in Cells 1-9. Clear plastic tubes will be inserted into glove ports similar to glove cartridges. These clear tubes will protrude into the cell and provide a means to illuminate the interior. Insertion of these tubes will be performed through secondary confinement similar to those used to insert a glove cartridge. PPE and supplied breathing air would also be used.

Cell windows consist of an assembly of six glass panes. Cleaning requires removal of the outer four panes. Sampling has demonstrated that seals for the remaining two panes remain intact and represent an adequate confinement barrier. As defense in depth, workers will be dressed out in PPE and supplied breathing air during window disassembly. The need for additional defense in depth measures will be evaluated during activity-level planning and hazard analyses.

In FY14, the deactivation project implements the following major activities:

- Return select Cells 6-9 manipulators to operation.
- Develop, fabricate and demonstrate long-handled/extension tools.
- Develop and implement an enhanced characterization methodology.
- Decontaminate Cells 6-9 and perform material removal.

Some manipulators will be removed from cells and replaced, or repaired and put back into service in support of efficient decontamination, immobilization and material removal. Worker protection is assured during removal/replacement/repair by having manipulators pulled into bags as primary confinement. A plastic hut will be erected around the manipulator ports as secondary confinement. Finally workers will be dressed out in PPE and supplied breathing air.

Developing and implementing a method of enhanced characterization is intended to provide more accurate measurements of the residual radiological inventory both before and after decontamination, material removal, and immobilization. The project will develop and test enhanced characterization methods in Cells 6-9 before and after decontamination of those cells.

Decontamination of the PuFF Facility cells will be accomplished by first removing, assaying and disposing of loose equipment within the cells and their attached glove boxes. Material removal will be performed via the existing equipment and penetrations for the cells and glove boxes (e.g., manipulators, glove ports, and bag out ports). Visual observations will be made to determine if other equipment within the cells can be disassembled utilizing standard hand and power tools via

the glove ports without undue risk to the workers. Loose material within the cells will be removed by standard techniques involving vacuums or scoops and buckets. Conceptually, vacuum units will be designed to be inserted into the cell where they will exhaust directly into the existing systems that maintain a net negative pressure in the cell. The deactivation project does not anticipate any large-scale dismantlement and removal (D&R) of equipment or demolition of structures. Some small-scale D&R of contaminated in-cell equipment (e.g., furnaces) is planned provided workers can perform the D&R with hand and power tools, but not with hot work.

Strippable coatings or other improved technologies may be used on flat surfaces to remove contamination. The decontamination process will be an iterative process where characterization surveys are performed between decontamination activities in order to determine a decontamination factor. Initial decontamination factors are expected to show considerable success in removing the contamination followed by diminishing returns as decontamination efforts continue. A final survey of the cells will be performed to determine the remaining quantity of radionuclides within the cells. It is anticipated that any remaining contamination will be immobilized through grouting of some equipment or other means that have been fully evaluated and researched before application.

Worker protection during removal of decontamination debris will be assured through use of engineered features such as bag out ports, glove bags as secondary confinement, and use of penetration-resistant gloves over the rubber gloves provided for in a glove cartridge. Workers will also be dressed out in PPE and supplied breathing air for decontamination activities.

In FY15, the deactivation project implements the following major activities:

- Prepare Cells 1-5 and their attached glove boxes (e.g., clean windows, install gloves and install temporary lighting).
- Return select Cells 1-5 manipulators to operation.
- Perform enhanced characterization of Cells 1-5 and their attached glove boxes.
- Perform research/analysis to determine the degree to which remaining Building 235-F MAR (in other process areas) is fixed and respirable.
- Revise/implement the Safety Basis (if needed) to cover activities intrusive to Cells 1-2 and their attached glove boxes.

Restoring cell infrastructure will be similar in scope to that performed in FY13. Return of manipulators to operation will be similar in scope to that performed in FY14 for Cells 6-9. Similarly, enhanced characterization will be similar in scope to that performed in FY14 for Cells 6-9.

Current hazard analyses only allow very small source term quantities because the hazard analyses assumed a sub-micron Pu-238 particle size, which conservatively drove selection of the Airborne Release Fraction (ARF) and the Respirable Fraction (RF). Decontamination/ immobilization activities are intended to remove or fix the easily-dispersed plutonium in the PuFF Facility. Also, other process areas in Building 235-F have been decontaminated to some degree and/or lacked the potential to create the sub-micron Pu-238 particles. Given this, the

deactivation project has set aside resources to (1) research the degree to which post decontamination/immobilization plutonium has been fixed, (2) establish process history for the other process areas, (3) perform characterization of the other process areas as needed to verify process history, and (4) determine whether source term factors (e.g., ARF and RF) can be adjusted for the remaining MAR. If the FY15 analysis demonstrates that the overall project objective (i.e., worse case mitigated dose to the co-located and facility worker is less than 100 rem) will be met, then the Project Team will continue to execute this Deactivation Project Plan as written. If otherwise, then the Project Team will expand the deactivation project and revise this Deactivation Project Plan to include additional deactivation.

In FY16, the deactivation project implements activities necessary to decontaminate Cells 1-5 and their attached glove boxes and to perform material removal/immobilization. Decontamination, worker protection and material removal activities are anticipated to be similar in nature to those previously described for Cells 6-9.

In FY17, the deactivation project performs enhanced characterization of Cells 1-5 and their attached glove boxes and revises the Safety Basis to cover the reduced radiological inventory.

History of Revisions

Revision	Date	Revised Section	Change
0	5/14/13	All	Initial Issue
1	5/28/13	1.0, 2.02, 6.04, 10.0 and Appendix E (Changes are indicated by marginal revision bars.)	Made several minor changes as follows in response to DOE comments: • Page 14 (Section 1.0) – Corrected typo. Stated that enhanced characterization occurs in Cells 6-9 rather than in Cells 1-5 in FY 14. Also, expanded listing of FY15 major activities to include research/analysis to determine the degree to which remaining 235-F MAR (in other process areas) is fixed and respirable. • Page 16 (Section 2.0) – Deleted "sizeable" in two places to be consistent with similar language in Section 1.0. • Page 19 (Section 2.02, Table 2.2) – Inserted "Other" and "Structure" in the table title to clarify what is listed in the table versus what is listed in Table 2.1. • Page 59 (Section 6.04) – Clarified that a revised outfall permit is not needed for the planned deactivation. • Page 71 (Section 10.0) – Updated information for Reference 10.33. • Page 117 (Appendix E) – Filled in table cell (under "verification method") that was inadvertently left blank.

Acronym List

ABL	Actinide Billet Line
ACM	Asbestos Containing Material
ACWP	Actual Cost of Work Performed
ACP	Area Closure Projects
AHA	Assisted Hazards Analysis
ALARA	As Low as Reasonably Achievable
ARA	Airborne Radioactivity Area
ARF	Airborne Release Fraction
BCP	Baseline Change Package
BCWP	Budgeted Cost of Work Performed
BCWS	Budgeted Cost of Work Scheduled
BIO	Basis for Interim Operation
CA	Contamination Area
CAM	Cost Account Manager
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CHA	Consolidated Hazards Analysis
CPI	Cost Performance Index
CPM	Critical Path Method
CV	Cost Variance
CX	Categorical Exclusion
D&D	Deactivation and Decommissioning
D&R	Dismantlement and Removal
DCF	Design Change Form or Dose Conversion Factor
DCP	Design Change Package
DID/ITS	Defense in Depth/Important to Safety
DL	Document and Label
DNFSB	Defense Nuclear Facilities Safety Board
DOE	U.S. Department of Energy
DR	Damage Ratio
EAC	Estimate at Completion
EC&ACP	Environment Compliance & Area Completion Project
ECA	Environmental Compliance Authority
ECN	Emergency Change Notice
EE	Engineering Evaluation
EEC	Environment Evaluation Checklist
EP	End Point
EPA	Environment Protection Agency
ERC	Eliminate or Reduce Contamination
ERH	Eliminate or Reduce Hazards
EV	Earned Value
EVMS	Earned Value Management System
FAC	Forecast at Completion
FAMS	F-Area Material Storage

FCDP	Facility Condition Documentation Package
FDAS	Fire Detection & Alarm System
FHA	Facility Hazards Analysis
FOSC	Facility Operations Safety Committee
FPP	Fire Protection Plan
FY	Fiscal Year
GCO	Generator Certification Officer
GPHS	General Purpose Heat Source
HCA	High Contamination Area
HEPA	High Efficiency Particulate Air
HVAC	Heating, Ventilation & Air Conditioning
iaw	in accordance with
IBARS	Integrated Budget, Accounting and Reporting System
ICH	Isolate and Contain Remaining Hazards
IH	Industrial Hygiene
IP	Implementation Plan
ISMS	Integrated Safety Management System
ISSM	Integrated Safeguards and Security Management
LLW	Low Level [Radioactive] Waste
LPF	Leak Path Factor
M&O	Management & Operations
MA	End Point Generic Work Type/Major Activity Type
MAR	Material at Risk
MBA	Material Balance Area
MC&A	Material Control and Accountability
MFHA	Modification Fire Hazards Analysis
MIP	Material Control & Accountability Implementation Plan
MR	Management Reserve
MT	Modification Traveler
NDA	Non-Destructive Assay
NEPA	National Environmental Policy Act
NESHAPS	National Emissions Standard for Hazardous Air Pollutants
NONA	Notice of NEPA Approval
OML	Old Metallography Laboratory
PA	Protected Area
PBS	Project Baseline Summary
PC	Project Controls
PCB	Polychlorinated Biphenyl
PEC	Plutonium Equivalent Curies
PEF	Plutonium Experimental Facility
P/L WHM	Puncture/Laceration Wound Hazard Management [Program]
POD	Plan of the Day
POW	Plan of the Week
PPE	Personal Protective Equipment
PuFF	Plutonium Fuel Form [Facility]
R&O	Risk & Opportunity

RA	Readiness Assessment
R^2A^2	Roles, responsibilities, authorities, and accountabilities
Radcon	Radiological Control
RBA	Radiological Buffer Area
RCRA	Resource Conservation & Recovery Act
RDW	Remove and Dispose of Wastes
RF	Respirable Fraction
RI	Refurbish or Install
RMA	Radiological Material Area or Risk Management Authority
RML	Risk Management Lead
ROAR	Risk & Opportunity Analysis Report
RTG	Radioisotope Thermoelectric Generator
RVA	Remove Valuable Assets for Sale or Re-use
RWP	Radiological Work Permit
S&M	Surveillance and Maintenance
SB	Safety Basis
SBRA	Safety Basis Regulatory Authority
SCDHEC	South Carolina Department of Health and Environmental Control
SME	Subject Matter Expert
SNM	Special Nuclear Material
SOB	Shift Operating Base
SPI	Schedule Performance Index
SRNL	Savannah River National Laboratory
SRNS	Savannah River Nuclear Solutions
SRS	Savannah River Site
SS	Safety Significant
SSC	Structures, Systems and Components
ST	Source Term
SV	Schedule Variance
SWB	Solid Waste Box
T&P	Technical & Programmatic [Risk]
T&PRA	Technical & Programmatic Risk Assessment
TOS	Termination of Safeguards
TPC	Total Project Cost
TRU	Transuranic
TSR	Technical Safety Requirements
USQ	Unreviewed Safety Question
VAR	Variance Analysis Report
WBS	Work Breakdown Structure
WIF	Waste Identification Form

Table of Contents

1.0 Summary

DOE recognizes the risk associated with the inventory of residual radiological materials within Building 235-F, and has concurred with the Defense Nuclear Facilities Safety Board's (DNFSB's) recommendations regarding that risk (References 10.1 and 10.2). Therefore, DOE has directed Savannah River Nuclear Solutions (SRNS) to undertake a deactivation project to reduce the risk associated with a Building 235-F accident (Reference 10.3). The deactivation project is the subject of this plan.

This Deactivation Project Plan addresses the deactivation of the PuFF Facility within Building 235-F, where the deactivation project is geared to the removal and/or immobilization of residual radiological material from/within the PuFF Facility. The plan targets the PuFF Facility because the PuFF Facility is the overwhelming contributor to risk due to its large inventory of Pu-238. Other process areas within Building 235-F contain residual radiological material. The deactivation project includes FY15 resources and activities to evaluate (and if needed further characterize) those areas and their associated inventories. If needed to meet the overall project objective (see following paragraph), then the Project Team will expand the project scope (at that time) to include these other process areas. The requirement for this plan is found in the SRNS Facility Disposition Manual 1C, Procedure 302, "Preparing a Deactivation Project Plan" (Reference 10.4).[1] Also, the plan satisfies various project management requirements as defined by SRNS Program Management Manual 6B, Procedure 1.4, "Standards for Projectizing Operational Projects and Activities" (Reference 10.5).[2]

The overall objective of the deactivation project is to reduce and/or immobilize the residual radiological material in Building 235-F so as to meet the requirements of 10 CFR Part 830 to protect the maximally exposed off-site individual to within the established DOE-STD-3009 evaluation guidelines and protect the co-located and facility worker within the accepted SRS guidelines of 100 rem (Reference 10.2). In achieving this objective, the deactivation project will employ reasonable means and methods to reduce the quantity and/or mobility of residual radiological material from/within the PuFF Facility.

Primarily, the deactivation project involves the removal and/or immobilization of residual radiological material from/within the 1st floor of the PuFF Facility, which includes Cells 1 through 9 and their attached glove boxes. The deactivation project does include limited deactivation activities on the 2nd floor of the PuFF Facility, associated with draining and isolating of services to/from the PuFF Facility cells below. The deactivation project will employ proven decontamination techniques (e.g., vacuuming and the application of decontamination agents) and will conduct material removal via the existing equipment and penetrations for the cells and glove boxes (e.g., manipulators, glove ports, and bag out ports). As currently scoped, the deactivation project does not include large-scale

[1] SRNS Facility Disposition Manual 1C is SRNS's implementing procedure for DOE Order 430.1B (see Supporting Document 9.1) and DOE Guide 430.1-3 (see Supporting Document 9.2).
[2] Manual 6B is SRNS's implementing procedure for the tailoring and application of project management requirements from DOE Order 413.3B to "operational activities" such as the PuFF Facility deactivation.

D&R of equipment or demolition of structures. Some small-scale D&R of contaminated in-cell equipment is planned provided workers can perform the D&R with hand and power tools, but not with hot work (e.g., grinding or plasma arc cutting).

The deactivation project implements the following primary strategies:

- Moving from lower-risk cells to higher-risk cells, using the lower-risk cells as a training environment and as a way to validate tools and processes in real-world conditions.
- Developing and implementing a method of enhanced characterization to enable more accurate measurements of the residual radiological inventory both before and after decontamination, material removal, and immobilization.
- Relying on existing ventilation rather than new, temporary ventilation.
- Relying on hand and power tools and operator experience rather than other unproven methods.
- Using trained operators, currently in the SRNS workforce, who have significant relevant, recent experience in transuranic (TRU) waste re-pack, HB Line operations, or both.

The deactivation project implements the following major activities by FY:

- FY14
  - Develop and implement a building-specific TRU waste management program.
  - Return select Cells 6-9 manipulators to operation.
  - Upgrade the breathing air system.
  - Develop, fabricate and demonstrate long-handled/extension tools.
  - Electrically/mechanically isolate Cells 6-9.
  - Perform enhanced characterization of Cells 6-9.
  - Decontaminate Cells 6-9 and perform material removal.
- FY15
  - Prepare Cells 1-5 and their attached glove boxes (e.g., repair windows, install gloves and install temporary lighting).
  - Revise/implement the Safety Basis to cover activities intrusive to Cells 1-2 and their attached glove boxes.
  - Return select Cells 1-5 manipulators to operation.
  - Electrically/mechanically isolate Cells 1-5 and their attached glove boxes.
  - Perform initial enhanced characterization of Cells 1-5 and their attached glove boxes and final enhanced characterization of Cells 6-9.
  - Perform research/analysis to determine the degree to which remaining Building 235-F MAR (in other process areas) is fixed and respirable.
- FY16
  - Decontaminate Cells 1-5 and perform material removal/immobilization.
- FY17
  - Perform final enhanced characterization of Cells 1-5 and their attached glove boxes.

- Revise the Safety Basis to cover the reduced radiological inventory, and implement the revision.

Preparatory activities are currently underway and are funded/authorized by Baseline Change Packages (BCPs) Nos. CR13M0033 and CR13M0045. The deactivation activities covered by this Deactivation Project Plan are scheduled for FY14 through FY17 (a four year period). As such, this Deactivation Project Plan establishes the baseline scope, cost and schedule for a four year project to start on October 1, 2013 and finish by September 30, 2017. The Total Project Cost (TPC) for the deactivation is approximately $60 million. The TPC includes overhead and contingency.

The Director of Solid Waste & F-Area Operations is the Project Owner. The Project Manager (PM) along with the Deactivation Manager, Deactivation First Line Supervisors, and Deactivation Workers are part of Solid Waste & F-Area Operations. The PM will report directly to the Project Owner. All other support groups (e.g., Engineering, Environmental Compliance, Industrial Hygiene, Maintenance, Project Controls, Radiological Protection, Rigging, Safety, etc.) will be "matrixed" to the project.

Over the past several years, DOE and its contractors prepared several discrete plans for risk reduction at Building 235-F.[3] Some plans included the complete demolition of the building to its slab, thus taking the building to its decommissioning end state. Other plans stopped well short of complete demolition, but still relied on extensive demolition of the PuFF Facility cells and on extensive use of specialized demolition equipment. Still other plans included minor demolition coupled with grouting of the building's interior spaces, thus taking the building to its decommissioning end state. This Deactivation Project Plan differs from the previous plans in that the Deactivation Project Plan places a greater reliance on decontamination, material removal and immobilization and less reliance on the demolition of systems and components as a means to remove the residual radiological material and thus reduce risk. The Project Team believes that this approach provides the highest likelihood of project success and the lowest overall project risk because the approach involves only minor modifications to the PuFF Facility cells and involves no special demolition equipment. Additionally, this Deactivation Project Plan differs from previous plans because the Deactivation Project Plan does not attempt to take Building 235-F to its decommissioning end state.

As currently scoped, the deactivation project is geared to the removal and/or immobilization of residual radiological material from/within the PuFF Facility. As such, the project focuses on risk reduction, rather than reduction of cost for subsequent custodial care of the facility (i.e., surveillance, maintenance, and operation of essential equipment) while waiting for decommissioning. As a result, completion of the deactivation project will not result in any significant reduction in surveillance and maintenance (S&M) costs for Building 235-F. Therefore, S&M costs for Building 235-F will remain at their current fully-burdened annual level of approximately $6.6M.

[3] See Section 9.0, Documents 9.20 through 9.22.

2.0 Project Scope

The Building 235-F Complex (consisting of Building 235-F along with its support facilities (e.g., Sand Filter, Building 292-2F) and ancillary structures (e.g., 235-2F, Refrigeration Building No. 2)) is shutdown and has been excessed[4]. All of the facilities and structure within the Complex are candidates for deactivation and/or decommissioning (D&D). While awaiting D&D, the various facilities and structures are being surveyed and maintained (i.e., the facilities and structures are undergoing S&M) to keep the facilities and structures in a safe condition while awaiting D&D. Although the facilities are being maintained in a safe condition, that condition is not without significant risk to co-located workers due to the inventory of residual radiological materials within Building 235-F. In the event of an accident (e.g., an earthquake and resultant fire), those materials could be released from their confinement, and co-located workers could be exposed to the materials.

DOE recognizes the risk associated with the inventory of residual radiological materials within Building 235-F, and has concurred with the DNFSB's recommendations regarding that risk (References 10.1 and 10.2). Therefore, DOE has directed SRNS to undertake a deactivation project so as to reduce the risk associated with a Building 235-F accident (Reference 10.3).

This Deactivation Project Plan addresses the deactivation of the PuFF Facility within Building 235-F, where the deactivation project is geared to the removal and/or immobilization of residual radiological material from/within the PuFF Facility. The plan/project targets the PuFF Facility because the PuFF Facility is the overwhelming contributor to risk due to its large inventory of Pu-238. Other process areas within Building 235-F contain residual radiological material. The deactivation project includes FY15 resources and activities to evaluate (and if needed further characterize) those areas and their associated inventories. If needed to meet the overall project objective (see Section 2.04), then the Project Team will expand the project scope (at that time) to include these other process areas. The requirement for this plan is found in the SRNS Facility Disposition Manual 1C, Procedure 302, "Preparing a Deactivation Project Plan" (Reference 10.4). Also, the plan satisfies various project management requirements as defined by SRNS Program Management Manual 6B, Procedure 1.4, "Standards for Projectizing Operational Projects and Activities" (Reference 10.5).[5] See Appendix F for a crosswalk between the tailored requirements within Manual 6B, Procedure 1.4 and this Deactivation Project Plan.

2.01 Facility Identification and Boundaries

Within the Building 235-F perimeter fence, there are four buildings that have (or have the potential for) residual radiological contamination, primarily in the form

[4] DOE has established a formal process for determining when a facility is no longer required for the Department's needs or the discharge of its responsibilities. The 235-F Complex has completed that process and is considered "excessed" and on the path for disposition.

[5] Manual 6B is SRNS's implementing procedure for the tailoring and application of project management requirements from DOE Order 413.3B to "Category 5 operational activities" such as the PuFF Facility deactivation with cost and performance information reported under Project Baseline Summary (PBS) 11C.

of Pu-238 or Np-237. Table 2-1 provides a listing of these four buildings, while Figure 2-1 provides an annotated overhead plan view of the buildings and structures within the Building 235-F perimeter fence.

Table 2.1 – Listing of Radiologically-Contaminated Buildings

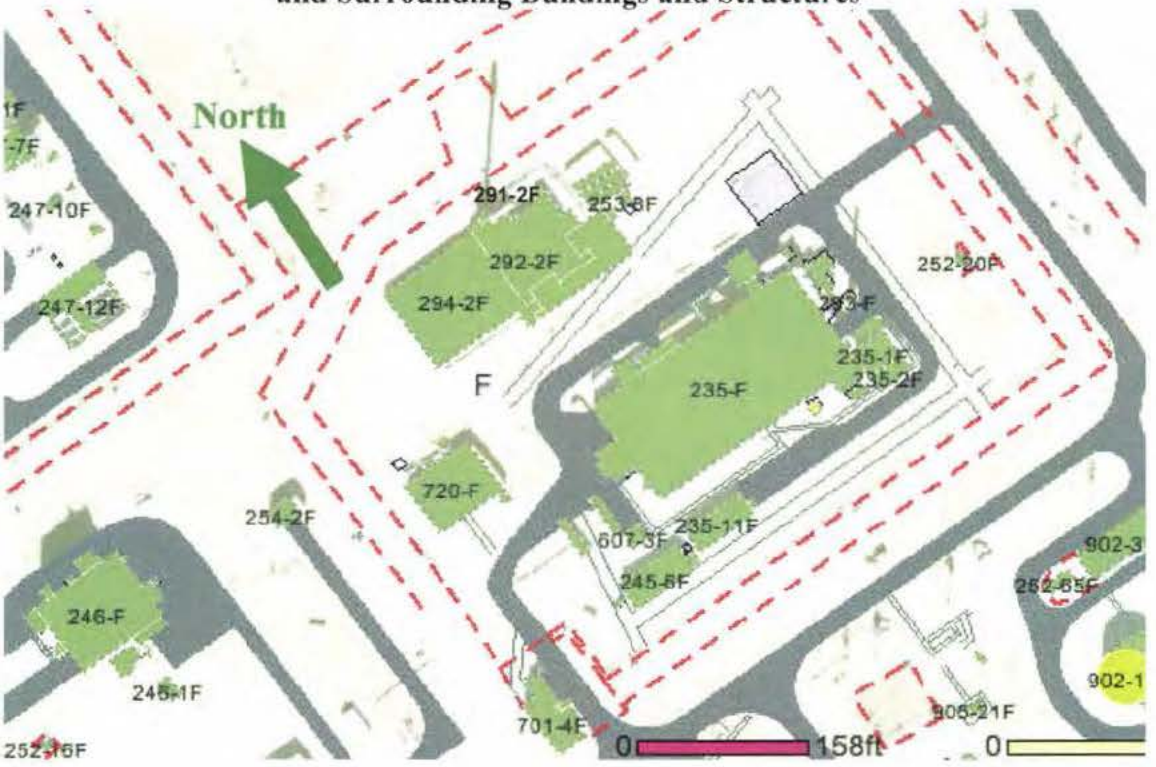
Building #	Building Title
235-F	Metallurgical Building
291-2F	New Stack
292-2F	Sand Filter Fan House
294-2F	Sand Filter[6]

Other facilities in the vicinity of Building 235-F include nuclear facilities and standard industrial buildings. F-Canyon (Building 221-F) is directly west of Building 235-F at a distance of approximately 270 meters, while the F-Area High Level Waste Tanks (e.g., Building 241-918F) are located southwest of Building 235-F at a distance of approximately 500 meters. An administrative building for the Mixed Oxide Fuel Facility Project is located approximately 200 meters north of Building 235-F and approximately 120 meters from Building 235-F's perimeter fence. Finally, the Waste Solidification Building (WSB) is approximately 85 meters east of Building 235-F's perimeter fence.

This Deactivation Project Plan details the deactivation activities associated with the PuFF Facility within Building 235-F. The PuFF facility is located on both the first and second floors of Building 235-F. The portion on the first floor has a floor area of approximately 4,400 square feet (~61' north-to-south and ~72' east-to-west), and consists of the following three primary rooms: Room 1002 (East Maintenance Area), Room 1003 (Shift Operating Base) and Room 1004 (West Maintenance Area). The portion on the second floor has a floor area of approximately 3,500 square feet (~55' north-to-south and ~60' east-to-west with an additional 200 square foot area at the southeast corner), and consists of the following five primary rooms: Room 2003 (Hot Press Room), Room 2008 (Inert Atmosphere Purification Room), Room 2009 (West Service Room), Room 2010 (East Service Room), and Room 2011 (Cold Feed Preparation Room). Per SRNS Drawings A-A2-F-2979 and A-A2-F-2980, the portions on the first and second floor are enclosed by Column Line A (north), Column Line E (south), Column Line 10 (east), and Column Line 6 (west).

[6] For purposes of this evaluation, the sand filter includes the underground tunnel between Building 235-F and the sand filter.

Figure 2.1 – Annotated Overhead Plan View of Building 235-F and Surrounding Buildings and Structures[7]



2.02 Facility Description and History

Building 235-F is a blast-resistant, windowless, two-story, reinforced-concrete structure approximately 222 feet long, 109 feet wide and 28 feet high. The two-story structure has double-reinforced, 14-inch thick, exterior walls. Pier footings and columns support the 8-inch thick (concrete) second floor and roof slabs, which are directly supported by a reinforced concrete beam and girder system. Some interior walls are reinforced concrete load-bearing walls. Within Building 235-F, exhaust air from various process areas/enclosures (containing residual Pu-238 and Np-237) is passed through double HEPA[8] filtration before discharge to Building 294-2F, a below-grade sand filter. Due to holdup of Pu-238 and Np-237 in the various process areas/enclosures, Building 235-F is a Category 2 nuclear facility.

Building 294-2F is a below-grade sand filter (of primarily concrete construction), which receives exhaust air from Building 235-F. The underground tunnel, linking the sand filter to Building 235-F, is considered part of Building 294-2F. The sand filter provides final filtration for the air exhausted from radiologically-

[7] The red dashed double lines (around Building 235-F) indicates the perimeter fence.
[8] HEPA = High efficiency particulate air

contaminated process areas/enclosures within Building 235-F. Exhaust air is drawn through the sand filter by fans located within Building 292-2F.

Building 292-2F is a separate structure (also of primarily concrete construction) connected to the east side of Building 294-2F. Building 292-2F contains 3 primary areas: (1) the fan room, (2) the diesel generator room, and (3) the Electrical Control Room. The diesel generator automatically supplies standby power to the exhaust fans and stack monitoring system following interruption of normal power. The Electrical Control Room contains the electrical equipment, which serves the exhaust fans and other building loads. As mentioned in the previous paragraph, the fans draw exhaust air through the sand filter, and discharge the exhaust air to Building 291-2F, a stack of metal construction. The stack, located next to Building 292-2F, provides elevated discharge of the exhaust air exiting the sand filter so as to enhance atmospheric dispersion.

In general, operations within Building 235-F were dry metallurgical processes with cold and hot presses and welding cabinets. There is an inactive experimental area for the dry Pu-238 process. The only wet parts were decontamination operations which used small amounts of fluids. Primary processes are located on the first floor and most support functions are located on the second floor. Storage vaults, which are empty and no longer used, are located on both the first and second floors.

Various other buildings and ancillary structures supported operations within the 235-F Complex. Those buildings/structures are listed within Table 2.2 along with a description of each building/structure.

Table 2.2 – Listing of Other Buildings/Structures Comprising the Building 235-F Complex

Bldg. #	Building Title	Description
235-1F	Refrigeration Building No. 1	This metal-sided building contains chillers which provide chilled water to Building 235-F in support of the building's heating, ventilation and air conditioning (HVAC).
235-2F	Refrigeration Building No. 2	This metal-sided building contains a chiller which provides chilled water to Building 235-F in support of the building's HVAC.
235-11F	Modular Office	Building 235-11F is a trailer that formerly provided office space for F-Area staff/workers.
235-17F	Modular Office Trailer	Building 235-17F is a trailer that formerly provided office space for F-Area staff/workers.
245-6F	Modular Office	Building 245-6F is a trailer that formerly provided office space for F-Area staff/workers.
252-9F	Secondary Transformer Station for 720-F	Located exterior and adjacent to Building 720-F, this structure is a pad-mounted transformer, which provides electricity to Building 720-F.
252-10F	Secondary Transformer Station for 292-2F	Located exterior and adjacent to Building 292-2F, this structure is a pad-mounted transformer, which provides electricity to Building 292-2F.
252-11F	Secondary Transformer Station for 235-11F	Located exterior and adjacent to Building 235-11F, this structure is a pad-mounted transformer, which provides electricity to Building 235-11F.
252-20F	Substation for 235-F	Located ~100' west of Building 235-F, this structure is a substation, which provides electricity to Building 235-F.

253-8F	15KV Outdoor Pad-mounted Switchgear	Located exterior and adjacent to Building 292-2F, this structure is a switchgear yard, which provides electricity to buildings and structures throughout the 235-F Complex.
281-28F	Spill Basin Canopy	This structure is a concrete pit with an underground storage tank and a light-metal canopy. The structure formerly received liquid process waste from Building 235-F. The tank has been isolated, emptied, cleaned and flushed.
285-11F	Induced Draft Cooling Tower	The cooling tower provides cooling water to the chillers in Buildings 235-1F and 235-2F.
293-F	Metallurgical Building Stack	This partially-demolished, concrete stack is no longer in service. At one time, Building 235-F discharged building air through the stack.
607-3F	Sewage Lift Station	Sanitary sewerage from Building 235-F is discharged to the lift station housed within a light-metal building. The lift station pumps the sanitary sewerage to the Site's central sanitary waste treatment facility.
701-4F	Gatehouse Entrance to 235-F	Building 701-4F was the "entry control facility" for the Building 235-F Complex. The facility is no longer active due to reduced security requirements for the Building 235-F Complex.
720-F	Central Alarm Station	The building was a central location for security alarms. The building is no longer active due to reduced security requirements for the Building 235-F Complex.

Note - Not all buildings listed in Table 2.2 are shown on the Figure 2.1 map, specifically 235-17F, 252-9F, 252-10F, 252-11F, and 285-11F.

Building 235-F was constructed in the 1950's as part of the original Savannah River Plant, and has been used for a variety of missions since that time. The original mission slated for Building 235-F was "C-Line". C-Line was to take Pu-239 metal and make triggers. However, before any equipment was installed, the mission was cancelled. Following the cancellation, the building was reconfigured for other missions.

The first mission for the reconfigured Building 235-F was the Actinide Billet Line (ABL). This line produced special billets (e.g., containing Np-237) for irradiation in SRS reactors. The next mission was the Plutonium Experimental Facility (PEF) and the PuFF Facility including a Metallography Lab (old ML or OML). These facilities produced spheres or pellets that were installed in a system referred to as a Radioisotope Thermoelectric Generator (RTG). The RTGs act as a power source, and convert heat from the radioactive decay of spheres or pellets (containing plutonium-238) into electricity. All metallurgical processes within Building 235-F (including PEF, PuFF, OML and ABL) were shutdown by 1990.

The building's most recent mission provided for the receipt, storage (within vaults), and disbursement of plutonium bearing materials in support of SRS and the DOE complex. In 2006, the vaults were de-inventoried and the facility was transitioned to a reduced S&M state. The primary focus of the reduced S&M is the operation and maintenance of systems for monitoring and containing the remaining radiological holdup within the process areas. Currently, Building 235-F is not occupied and is monitored remotely. See Appendix A for additional details on the facility history.

The first floor of Building 235-F has three process areas that contain the radiological holdup: PuFF, PEF and the ABL. Maintenance areas and ventilation ducts associated with PuFF and PEF are found on the second floor along with the OML and contaminated inert gas equipment. These second floor areas also contain radiological holdup. The holdup was assayed and the assay values are summarized in Reference 10.6. For the purposes of accident analysis (i.e. preparation of the Consolidated Hazards Analysis (CHA), Reference 10.7), the reported values were nearly doubled for conservatism.

2.03 Condition of Facility

Building 235-F is in good condition overall. The exterior of the building is constructed of reinforced concrete, which is free of significant cracking/spalling or other structural/cosmetic defects. Building 235-F's roof is in excellent condition having been replaced in 2012. Interior walls are also in good condition with no significant structural defects. Although aged, the building's operational systems (e.g., air supply and exhaust, HEPA filtration, instrument air, communications, domestic water, sanitary sewer, and electrical power) are also in good condition, and are expected to remain in operation for the life of the deactivation project. The Fire Detection and Alarm System (FDAS) is being upgraded to improve its maintainability. That system is also expected to remain in operation for the life of the deactivation project.

Building 235-F has had extensive assays performed in its process areas/ enclosures, where residual radiological (primarily Pu-238 and Np-237) holdup remains (see Reference 10.6 for a listing of assays). Neither Building 291-2F, the Exhaust Stack, nor Building 294-2F, the Sand Filter, have been assayed. However, the Sand Filter has been entered and has been surveyed per the SRS radiological controls program (Manual 5Q). Based on those surveys, the radiological inventories in these buildings are assumed to be minimal (less than the thresholds for a Category 3 nuclear facility) and are bounded by the estimated inventory within Building 235-F because the exhaust air from Building 235-F has been double-HEPA filtered, prior to reaching the sand filter (and associated underground tunnel) and stack.

Radiological contamination resides in many areas of Building 235-F, primarily in those areas containing a shutdown radiological process. The following table provides a snapshot of the current radiological postings within Building 235-F. Note that these postings will change as a result of ongoing and planned S&M and deactivation.

The breathing air system within Building 235-F is no longer operational because the system does not meet current requirements for breathing air as defined by Reference 10.9. As such, the existing breathing air system will not support the deactivation project because the Project Team will likely use breathing air for most radiological operations that breach the cells'/glove boxes' primary confinement (e.g., replacement of the manipulators). The existing system would

be expensive to upgrade/retrofit. Therefore, the Project Team will need to acquire, install, operate and maintain a temporary breathing air system.

Table 2.3 – Listing of Primary Radiological Areas within Building 235-F

Process/ Area	Room	Description
PEF	153	Room is posted as a CA.
	153A	Room is posted as an RBA.
	154	The room is predominantly an RBA. Areas adjacent to the west wall are CAs.
OML	2004	Room is posted as an RBA.
ABL	107A/B/D/G	The room is predominantly an RBA. Areas adjacent to the glove boxes are CAs.
PuFF	1002	Entire room is posted as a HCA and ARA.
	1003	The room is predominantly an RBA. Areas adjacent to Cells 1-5 are CAs.
	1004	The room is predominantly an RBA. Areas adjacent to Cells 6-9 are CAs.
	2003	Room is posted as an RBA.
	2008	Room is posted as an RBA.
	2009	Room is posted as an RBA.
	2010	Entire room is posted as a HCA and ARA.
	2011	Room is posted as an RBA.
HEPA Filtration	2000	The room is predominantly an RBA. Areas around the HEPA banks are CAs.
Waste Storage Area	1005	Room is posted as an RBA.
Material Transfer Room	162	Room is posted as an RBA.
Various Non-Process Rooms	139, 140, 141, 148, 150, 151, 156, 160, 163, 164, 165	All or parts of the rooms are posted as RBAs
Corridors/ Airlocks/ Stairwells	Multiple	Areas are posted as RBAs.

Note – As defined by Manual 5Q (Reference 10.8), ARA = Airborne Radioactivity Area, CA = Contamination Area, HCA = High Contamination Area, RBA = Radiological Buffer Area.

Structural Mechanics recently inspected Building 235-F and issued a report, which documented the results of their inspection (Reference 10.10). Overall, the report concluded that the building was structurally sound. Minor structural issues were identified throughout the building, but no issues were identified that would (1) prevent passage to/from the PuFF Facility and adjoining support areas, (2) prevent work within the PuFF Facility and adjoining supporting areas, or (3) impact supporting infrastructure (e.g., electrical power and exhaust ventilation). The report identified the following deficiencies/recommendations for the PuFF Facility, which the Project Team will address, as needed, as part of the deactivation project:

- Some cells windows (exterior panes only) were cracked, but not to the extent that there was a loss of confinement. Monitoring of the cracks was recommended.
- There were unanchored components (Fire King File Cabinet and two instrument cabinets) in Room 1003 that should be removed or relocated so as to ensure no topple against and damage to a shield window.
- Some leakage was noted from a shield door in Room 1003, causing some peeling paint. The area could be repainted to limit corrosion.
- There is an unanchored test cabinet in Room 1004 adjacent to a glove box. The cabinet should be removed or relocated so as to ensure no topple against and damage to a glove box.

- There is a poorly-supported "chilled water collector tank" in Room 1002. The tank could topple and damage the adjacent hot press. Further evaluation by Structural Mechanics was recommended.
- Within Room 1002, the access door to the space below Cell #3 is showing some in-leakage due to a corroded sill. The sill will continue to be monitored semiannually per Work Order 01186988.
- The welding machine in Room 2009 is not anchored. The welding machine should be removed or secured so as to ensure no topple against and damage to contaminated components.
- Within Room 2010 are two loose items (step ladder and cabinet) that should be removed or secured so as to ensure no topple against and damage to contaminated components.

As part of the implementation for the 235-F S&M Basis for Interim Operation (BIO, Reference 10.11), F-Area Operations recently implemented an "enclosure integrity program" (References 10.12 and 10.13) for the various radiological enclosures within Building 235-F including the PuFF Facility cells and glove boxes. The program provides "reasonable assurance that the evidence of structural or functional degradation of the Building 235-F process enclosures is detected to permit corrective action before the credited function is compromised" (Reference 10.12). This program is independent of the PuFF Facility deactivation and is a critical component of Building 235-F's S&M program. Although outside the deactivation project, the program does support the project by ensuring workers can safely work in and around the PuFF Facility cells and glove boxes. Additionally, the program ensures no loss of confinement in other process areas within Building 235-F, where loss of confinement could prevent workers from accessing the PuFF Facility.

2.04 Safety Basis Documentation

The following documents are the current safety basis (SB) for Building 235-F (Reference 10.14):

- "Safety Analysis – 200 Area, Building 235-F," WSRC-RP-89-575, Revision 3, January 2003 (Reference 10.15).
- "Technical Safety Requirements, Building 235-F," WSRC-TS-97-3, Revision 14, April 2010 (Reference 10.16).
- "Justification for Continued Operations, Upgraded Interim Control Posture For Building 235-F," WSRC-RP-2004-00432, Revision 7, April 2010 (Reference 10.17).

No deactivation activities are planned or will be conducted under the above documents. The above documents will shortly be superseded by the following documents geared to S&M of Building 235-F:

- "Building 235-F Basis for Interim Operations," U-BIO-F-00002, Revision 0, October 2012 (Reference 10.11).

- "Technical Safety Requirements, Building 235-F," U-TSR-F-00002, Revision 0, October 2012 (Reference 10.18).

The above BIO and Technical Safety Requirements (TSR) provide for S&M of the facility and allow certain activities that are NOT intrusive to the PuFF Facility cells and glove boxes because those activities are considered maintenance. As examples, installation of gloves, cleaning of shield windows, and installation of temporary lighting are non-intrusive, maintenance activities, which the deactivation Project Team can perform under the "S&M" BIO/TSR. The S&M BIO/TSR does not cover deactivation activities that are intrusive to the PuFF Facility cells and glove boxes. As a result, the Project Team is already working on a new "deactivation" BIO and TSR, which address the scope of this Deactivation Project Plan including the planned tooling, techniques, means and methods.[9] The BIO and TSR must be approved and implemented prior to activities that are intrusive to the PuFF Facility cells and glove boxes. The deactivation BIO and TSR will supersede the S&M BIO and TSR. The deactivation BIO and TSR are listed as follows:

- "Basis for Interim Operations for Building 235-F, Deactivation," U-BIO-F-00003, Revision 0 (draft), date TBD (Reference 10.19).
- "Technical Safety Requirements, Savannah River Site, Building 235-F, Deactivation," U-TSR-F-00005, Revision 0 (draft), date TBD, (Reference 10.20).

The Revision 0 deactivation BIO and TSR were originally geared to Cells 6-9, which is the initial focus of the deactivation project. Because the inventories within Cells 3-5 and their glove boxes are similar to those within Cells 6-9, the Project Team expanded the scope of the Revision 0 deactivation BIO and TSR to cover activities that will be intrusive to Cells 3-5 and their attached glove boxes. This expansion provides the Project Team with the ability to work in those cells at an earlier date (and potentially accelerate the overall project schedule) rather than wait on a revision to the "deactivation" BIO/TSR.

The Project Team recognizes that DOE will prepare and issue an initial Authorization Agreement (in accordance with SRNS Manual 11Q), which allows intrusive work only in Cells 6-9. Provided (1) deactivation of Cells 6-9 is successful and without incident, and (2) Cells 3-5 are ready for decontamination and material removal, the Project Team will seek a revision to the agreement to allow the Project Team to accelerate Cells 3-5 activities (i.e., initiate decontamination and material removal in FY15 rather than FY16). The Project Team also recognizes that the Revision 0 BIO/TSR scope is above and beyond the IP Milestone 1-2 to "Issue the Building 235-F Deactivation BIO to include

[9] The preparers (N&CS Engineering) of the BIO, TSR and support documents are members of the Project Team (see Appendix I). Additionally, the preparers are contributors to this Deactivation Project Plan. Conversely, other members of the project team are contributors/reviewers/approvers of the BIO, TSR and support documents. This Project Team approach ensures the safety basis and Deactivation Project Plan are consistent and fully integrated.

deactivation activities in PuFF cells 6 through 9" (References 10.2 and 10.3). Although above and beyond the milestone, the Revision 0 deactivation BIO/TSR does bound the requirement for a SB to cover deactivation activities intrusive to Cells 6-9. Therefore, the current expanded Revision 0 BIO/TSR meets the IP milestone.

The deactivation BIO and TSR will be revised as part of the deactivation project to cover activities that are intrusive to Cells 1-2 and their glove boxes. The revision is currently scheduled for FY15. As a minimum, the revision will include a description of activities that are intrusive to Cells 1-2 and their glove boxes. If needed, then the revision will incorporate a revised control set as a result of lessons learned from completed Cells 3-9 activities.

2.05 Post Deactivation End State[10]

The primary purpose of the deactivation project is to remove and/or immobilize the residual radiological material from/within the Building 235-F PuFF Facility. These activities mitigate the consequence of a release by reducing the amount of material available for release. Other process areas within Building 235-F contain inventories of residual radiological material.[11] This Deactivation Project Plan does not *currently* provide for the deactivation of these other process areas within Building 235-F.[12] Also, the deactivation project does not deactivate other facilities and structures within the Building 235-F Complex.[13]

In addition to the removal/immobilization of residual radiological material from/in Building 235-F, Reference 10.3 requires the (1) removal, encapsulation or isolation of fixed combustibles, (2) de-energization of unneeded electrical equipment, (3) upgrades to the fire detection & alarm system, and (4) upgrades to the applicable emergency preparedness program. These four activities collectively reduce the risk associated with Building 235-F by reducing the severity and frequency of a fire and by ensuring proper and adequate response to an event (e.g., fire resulting from a seismic event). Because they are being undertaken as part of the Building 235-F's S&M program (and implemented under the building's S&M safety basis), these four activities are outside the scope

[10] The "deactivation end state" is the condition of the facility at the end of the deactivation project and does not correspond to the "final end state" or "decommissioning end state," which is the condition at the end of a decommissioning project.

[11] As examples, there are measurable inventories of Pu-238 in PEF and measurable inventories of Np-237 in ABL.

[12] See following paragraphs within this section for a description of planned FY15 analysis that could impact the scope and duration of the deactivation project (e.g., the Project Team may need to remove/immobilize MAR in other process areas).

[13] Further deactivation would be preceded by discussions with the Environmental Protection Agency (EPA) and the South Carolina Department of Health and Environmental Control (SCDHEC), which determine the appropriate decommissioning end state for the Building 235-F Complex. Those discussions would shape the extent and nature of additional deactivation and would be in accordance with applicable Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) regulations, relevant DOE and EPA guidance, and the *Federal Facility Agreement for the Savannah River Site.*

of the PuFF Facility deactivation and therefore outside the scope of this Deactivation Project Plan.

Coupled with the four activities mentioned in the previous paragraph, the removal/immobilization of material in the PuFF Facility reduces the risk associated with Building 235-F. Together, the five activities have the following objectives (Reference 10.3):

- De-energize and, where practical, air-gap electrical components or circuits to reduce the likelihood of a facility fire.
- Reduce to the extent feasible, the risk associated with Building 235-F transient and fixed combustibles that are not directly necessary for S&M activities.
- Provide a reliable PuFF Facility fire detection system that is maintained and operated consistent with National Fire Protection Association 72 requirements.
- Implement an F-Area drill program that demonstrates that emergency plans protect co-located personnel from the hazards associated with a radiological release from Building 235-F.
- Reduce the MAR in the facility to meet the requirements of 10 CFR Part 830 to protect the maximally exposed off-site individual to within the established DOE-STD-3009 evaluation guidelines and protect the co-located and facility worker within the accepted SRS guidelines of 100 rem.

It is the final objective that has most bearing on the deactivation project and best defines Building 235 at project completion. From a practical perspective, the requirement to "protect the maximally exposed off-site individual" has no bearing on the planned deactivation because the current consequence to that individual is less than the applicable Evaluation Guidelines. Hence, there are no current "safety class" controls for Building 235-F. In contrast, there is a significant consequence to the co-located and facility worker: the *unmitigated* consequence could exceed 28,800 rem during a seismically-induced, full-facility fire (Reference 10.21). Therefore, there are several "safety significant" controls for Building 235-F. The purpose of those safety significant controls is to reduce the consequence to below 100 rem. However, the gap between 28,800 rem and 100 rem is sufficiently large that there is no current set of safety significant controls that brings the *mitigated* consequence to below 100 rem.[14] Therefore, to reduce the consequence (and therefore the risk), the MAR in Building 235-F must be removed and/or immobilized.

[14] The building's current exhaust ventilation and filtration system is not seismically-qualified and is assumed to fail during a seismic event. The current system could be upgraded. However, an upgrade is not planned in lieu of MAR removal because the upgrade would be expensive and because the upgrade does not provide for permanent risk reduction.

The Project Team recognizes that the planned deactivation of the PuFF Facility alone may not meet the final objective for two reasons. First, the planned deactivation, which does not include large-scale D&R, may not remove/ immobilize enough MAR from/within the PuFF Facility. Second, too much MAR may reside in other Building 235-F process areas. To address these two issues, the deactivation project includes FY15 activities and resources (see WBS No. 01.29.24.01.14.01) for the Project Team to (1) analyze the anticipated PuFF Facility radiological inventory at project completion along with the inventories in other process areas and (2) confirm the final objective is met (i.e., worse case mitigated dose to the co-located and facility worker is less than 100 rem).

The FY15 (forward-looking) analysis will seek to adjust the RF and ARF for the MAR in the PuFF Facility based on its successful decontamination and immobilization, where the sub-micron particles have been removed and the form of the remaining MAR has been changed (i.e., the remaining MAR is fixed in place). For the other process areas, the FY15 analysis will seek to adjust the RFs and ARFs based on process knowledge and, as needed, additional characterization, which confirms and/or fills gaps in the process knowledge. Along these lines, the deactivation project includes entries into the PEF and OML glove lines for the purpose of characterization (e.g., sample/analysis to determine particle size distributions, enhanced characterization to establish a revised MAR based on lower uncertainty, and sample/analysis to determine what is fixed versus transferrable). Finally, the FY15 analysis will review the fire scenarios for Building 235-F. After fixed combustible removal and de-energization, an unfiltered, full-facility fire may no longer be the bounding accident for Building 235-F. Rather, a room fire may be the bounding accident and it may be appropriate to establish threshold inventories for the individual process areas versus for the entire facility. (See WBS No. 01.29.24.01.14 in Appendix C for additional background regarding the planned FY15 analysis.)

If the FY15 analysis demonstrates that the final objective (i.e., worse case mitigated dose to worker is less than 100 rem) will be met, then the Project Team will continue to execute this Deactivation Project Plan as written. If the FY15 analysis demonstrates that the overall objective will not be met, then the Project Team will re-scope the deactivation project and revise this Deactivation Project Plan (in late FY15) to include (1) more extensive FY16/FY17 deactivation of the PuFF Facility and/or (2) FY16/FY17 deactivation activities for the other process areas. If needed, current FY17 deactivation activities (e.g., revise the safety basis, WBS No. 01.29.24.01.22.01) will be deferred to FY18 to allow time for the Project Team to complete the additional deactivation.[15]

The deactivation project will employ only reasonable means and methods to achieve the final objective listed above. Further, the deactivation project will

[15] Although project duration is increased by one year, the Project Team will still achieve all of the References 10.2 and 10.3 milestones (see Table 2.4).

employ proven decontamination techniques (e.g., vacuuming and the application of decontamination agents) and will conduct material removal via the existing equipment and penetrations for the cells and glove boxes (e.g., manipulators, glove ports, and bag out ports). Finally, as currently scoped, the deactivation project will not include large-scale D&R of equipment or demolition of structures. Some small-scale D&R of contaminated in-cell equipment (e.g., furnaces) is planned provided workers can perform the D&R with hand and power tools, but not with hot work.

References 10.2 and 10.3 established several milestones for the PuFF Facility deactivation. The milestones are listed in the following table. Coupled with the overall objective to reduce/immobilize MAR and therefore risk, these milestones define the deactivation end state for both the PuFF Facility and the overall deactivation project. The deactivation project covered by this Deactivation Project Plan addresses each of the milestones and provides a plan for achieving each of the milestones.

Table 2.4 – Listing of Milestones Applicable to PuFF Facility Deactivation

#	Action	Due Date
Removal and/or Immobilization of Residual Radiological Material		
1-1	Complete project deactivation planning for PuFF Cells 1-9	5/30/2013
1-2	Issue the Building 235-F Deactivation BIO (which supersedes the S&M BIO) to include deactivation activities in PuFF cells 6 through 9.	7/30/2013
1-3	Restore cell infrastructure in PuFF cells 6 through 9.	10/30/2013
1-4	Complete a Readiness Assessment (RA) for initiation of deactivation activities in PuFF cells 6 through 9 and implement the Deactivation BIO.	10/30/2013
1-5	Update planning schedule to reflect PuFF cells 1 through 5 deactivation actions for the upcoming 12 months.	12/31/2013
1-6	Update planning schedule to reflect PuFF cells 1 through 5 deactivation actions for the upcoming 12 months.	12/31/2014
1-7	Revise the Hazards Analysis, and if necessary the Building 235-F Deactivation BIO to include deactivation activities in PuFF cells 1 through 5.	6/30/2015
1-8	If needed, complete an RA for initiation of deactivation activities in PuFF cells 1 through 5 and implement the revised Deactivation BIO.	9/30/2015
1-9	Using enhanced characterization techniques, identify a list of significant components and/or equipment to be removed for MAR reduction in Cells 1 through 5.	9/30/2015
1-10	Update planning schedule to reflect PuFF cells 1 through 5 deactivation actions for the upcoming 12 months.	12/31/2015
1-11	Restore cell infrastructure in PuFF cells 1 through 5.	5/31/2016
1-12	Update planning schedule to reflect PuFF cells 1 through 5 deactivation actions for the upcoming 12 months.	12/31/2016
1-13	Update planning schedule to reflect PuFF cells 1 through 5 deactivation actions for the upcoming 12 months.	12/31/2017
1-14	Complete the deactivation of Cells 1 through 9. This will include waste removal.	12/31/2017
1-15	Using enhanced characterization techniques, derive a final (post deactivation) MAR value to be used for deactivation end-state selection and regulatory acceptance. This will demonstrate mitigation of the hazard and resultant risk reduction.	6/30/2018
1-16	Revise the 235-F Deactivation BIO once the MAR is removed and acknowledge the facility meets the requirements of 10 CFR Part 830 to protect the maximally exposed off-site individual to within the established DOE-STD-3009 evaluation guidelines and protect the co-located and facility worker within the accepted SRS guidelines of 100 rem.	12/31/2018

2.06 Constraints

The deactivation project is impacted by the following primary constraints:

- The PuFF Facility within Building 235-F is undergoing "deactivation" where the intent of deactivation is to reduce hazards and risks associated with the building. In contrast, "decommissioning" takes the Building 235-F to its final end state, and involves an entirely different regulatory process involving CERCLA regulations and involving input from stakeholders such as EPA, SCDHEC and the Public. Because it does not follow the normal regulatory process, deactivation must not include activities that take the building to its final end state or bias the selection of the final end state. As an example, complete grouting of the PuFF Facility cells is not an acceptable deactivation activity.
- The deactivation must be compliant with the DOE's Implementation Plan (IP) for DNFSB Recommendation 2012-1 (Reference 10.2).

3.0 Deactivation End Points

The Building 235-F PuFF Facility has been divided, as follows, into twelve (12) distinct zones for the PuFF Facility deactivation:

Note: Each zone cube extends from floor to the underside of the second floor slab and laterally to the limits shown on Appendix D Zone Identification drawings.

- Zone 1: West Maintenance Area, including attachments to the exterior of Cells 6 – 9 on their West Maintenance Area side, but not including Cells 6 – 9 themselves
- Zone 2: Cells 6 – 9
- Zone 3: Shift Operating Base (SOB), including attachments to the exterior of Cells 1 – 9 on their SOB side, and under floor chase/tunnel (but, not including transfer piping)
- Zone 4: Cells 3 – 5 including Wing Cabinets, Hot Press, & transfer piping
- Zone 5: Cells 1 – 2
- Zone 6: East Maintenance Area, including attachments to the exterior of Cells 1 – 5 on their East Maintenance Area side, but not including Cells 1 – 5 themselves
- Zone 7: Room 2000 - Filter & Exhaust Room
- Zone 8: Corridor 2002 & Room 2003 – Hot Press Auxiliary Equipment Room
- Zone 9: Room 2010 – PuFF Facility East Service Room
- Zone 10: Room 2009 – PuFF Facility West Service Room
- Zone 11: Room 2008 – PuFF Facility Inert Atmosphere Room
- Zone 12: Room 2011 – Cold Feed Preparation Room

Reference 10.25 provides a suggested list of eleven (11) generic work types/major activities (MAs) for consideration. The Project Team evaluated the eleven (11) generic work types/MAs, and determined that the following eight (8) MAs were applicable to the PuFF Facility deactivation:

1) Eliminate or reduce hazards (ERH)
2) Eliminate or reduce contamination (ERC)
3) Remove and dispose of wastes (RDW)
4) Isolate and contain remaining hazards (ICH)
5) Refurbish or install (RI)
6) Remove valuable assets for sale or re-use (RVA)
7) Document and label (DL)
8) Engineering evaluation (EE).

The Project Team identified deactivation end points for each zone and for each applicable MA in accordance with SRNS Manual 1C, Procedure 301 (Reference 10.24) and using the "checklist method" as described in DOE/EM-0318 Chapter 6 and desktop guide WSRC-TR-2001-00208, "Determining End Points For Disposition Projects Using the Checklist Method" (Reference 10.25), where the use of the checklist method was approved by SDD-2013-00022 (Reference 10.26). Provided only the PuFF Facility requires deactivation (see Section 2.05 for a discussion of other process areas and the potential for additional deactivation activities), the identified deactivation end points fully support the overall objective for the deactivation project and fully support the Table 2.4 milestones. The identified deactivation end points do not take the Building 235-F to a final end state or bias the selection of a final end state.

A tabulation of PuFF Facility deactivation end points, listed by zone, can be found in Appendix E of this document. All deactivation end points fall into one of the above MAs. Within Appendix E, each end point is assigned a unique identifier, where the identifier indicates which MA is applicable (first part of identifier) and which zone is covered by the end point (second part of identifier).[16]

After issuance of this Deactivation Project Plan, the Project Team will issue the Appendix E deactivation end points as a separate, stand-alone document to aide tracking and closure of the end points. Upon completion of all deactivation end points, the Project Team will prepare a stand-alone end points completion report that provides objective evidence that each and every end point is complete. That end points completion report will act as a reference to the deactivation project completion report required by SRS Manual 1C, Procedure 303, "Preparing a Deactivation Project Final Report" (Reference 10.82). The Project Team will prepare both reports under WBS No. 01.29.24.01.22.02.

4.0 Surveillance and Maintenance

4.01 Current Requirements

Building 235-F is currently covered by a stand-alone, pre-deactivation Surveillance & Maintenance Plan (Reference 10.27) prepared in accordance with SRNS Manual 1C, Procedure 105 (Reference 10.28). The plan is currently being revised to add additional structural surveillances to further ensure the structural integrity of the facility is monitored, maintained, and in compliance with DOE

[16] Note that "GEN" indicates that the end point is a "general" end point, applicable to all zones, while "EP" merely stands for "end point."

requirements/ guidance. These additional surveillances will focus on physical features, which confine the residual radiological material and prevent its leakage from the building. The additional surveillances will also focus on the deterioration of internal and external SSCs. In addition to a discussion of the overall S&M program at Building 235-F, the S&M Plan also contains, as attachments, lists of the preventive maintenance items, Building 235-F drawings, and applicable procedures sorted by system. The annual (FY 2013) fully burdened budget for pre-deactivation S&M at Building 235-F is $6.6M.

4.02 During Deactivation

F-Area Operations will continue to own Building 235-F and continue to perform S&M of the 235-F Complex throughout the life of the deactivation project. That S&M will be in accordance with the latest revision of the S&M plan (Reference 10.27) and the approved/implemented Building 235-F BIO and TSR (e.g., References 10.19 and 10.20). Because the deactivation project makes few changes to operating SSCs (a notable exception is the installation of low delta P alarms for the PuFF Facility (see WBS No. 01.29.24.01.07.01.01)), it is anticipated that the planned deactivation will not have a significant impact on the scope or extent of S&M during deactivation. Note that WBS No. 01.29.24.01.07.01.01 provides for the implementation of new S&M requirements applicable to the planned deactivation. Also note that WBS Nos. 01.29.24.01.12.02, 01.29.24.01.18.02, and 01.29.24.01.21.02 provide for the sharing of S&M costs with F-Area Operations.

4.03 After Deactivation

The deactivation project currently involves the PuFF Facility within Building 235-F. Although the Project Team may expand the deactivation project to include other process areas within Building 235-F, the deactivation project will not involve the entire building or its ancillary buildings and structures. The deactivation project currently targets removal and/or immobilization of the residual radiological material (i.e., Pu-238 holdup) within the PuFF Facility. This removal/immobilization reduces the consequence of a release by reducing the amount of material available for release, and therefore, reduces the risk associated with a Building 235-F accident. As such, the deactivation project focuses on hazard and risk reduction, rather than reduction of cost for subsequent custodial care of the facility (i.e., surveillance, maintenance, and operation of essential equipment) while waiting for decommissioning. As a result, completion of the deactivation project will not result in any significant reduction in S&M costs. S&M costs will remain at approximately their current fully-burdened level of $6.6 Million.

5.0 Project Execution

5.01 Responsibilities and Organizational Interfaces

An "integrated project team" will perform the deactivation defined by this project plan. The integrated project team (referred to as the Project Team throughout this document) will have the following primary members:[17]

- Project Manager (PM, reports to the Solid Waste & F-Area Operations Director)
- Project Controls Manager (SWM/TRU Project Controls)
- Project Controls specialists including "schedulers" and "analysts" (SWM/TRU Project Controls)
- Deactivation Manager (reports to the PM)
- Deactivation First Line Supervisors (reports to the Deactivation Manager)
- Deactivation Workers (report to the Deactivation First Line Supervisors)
- Radiological Protection Manager (Central Labs Safety & Health)
- Radiological Protection First Line Supervisor (Central Labs Safety & Health)
- Radiological Protection Inspectors (Central Labs Safety & Health)
- Radiological Engineer (Health Physics and Radiological Engineering)
- Design Authority Manager (SW&F-Area Engineering)
- Design Authority Engineers (SW&F-Area Engineering)
- Project Engineer (SW&F-Area Engineering)
- Deactivation Engineers (EC&ACP Engineering)
- Design Engineers (Design Engineering)
- Fire Protection Engineer/Fire Protection Coordinator (Fire Protection Engineering)
- Safety Basis Analysts/Safety Basis Regulatory Authority (SBRA) (Nuclear & Criticality Safety Engineering)
- Environmental Compliance Authority (ECA) (Environmental Compliance)
- Generator Certification Official (GCO) (Environmental Compliance)
- Industrial Hygienist (ESS&H)
- Safety Engineer (ESS&H)
- Work Control Planners (Facility Maintenance & Planning)
- Procedure Writers/Coordinators (Operations Procedures)
- Maintenance First Line Supervisor (Facility Maintenance & Planning)
- Maintenance Mechanics (Facility Maintenance & Planning)
- Facility Manager/Facility Custodian (F-Area Operations)

[17] The current organization for each member is identified in parentheses. The identified organization is provided for information only and is a snapshot of the Project Team at the time this plan is issued. It is recognized that organizational titles and reporting hierarchies are subject to change. This Deactivation Project Plan will not be updated to capture those changes. Instead, the PM will maintain a staffing plan and "project table" separate from this plan.

- Rigging First Line Supervisor (Rigging)
- Riggers (Rigging)
- Rigging Engineer (Site Infrastructure Engineering)
- Quality Assurance (Quality Services)
- Non-Destructive Assay (NDA) technician within SRNL
- Procurement specialist/buyer (Procurement)
- F-Area Facility Operations Safety Committee (FOSC)
- R&D Engineers/Scientists/Technicians (within SRNL)

The DOE is the primary stakeholder/customer for the PuFF Facility deactivation. At their discretion, they will participate in the deactivation as part of the Project Team. To facilitate their participation, the Project Manager will provide regular status and progress updates to DOE, and all members of the Project Team will provide status and progress updates upon request.

Roles, responsibilities, authorities, and accountabilities (R^2A^2) for the primary members of the Project Team are defined by Reference 10.29 and by the procedure(s)/manual(s) applicable to the team member. As an example, R^2A^2 for the ECA are defined by SRNS Manual 3Q. As another example, R^2A^2 for the GCO are defined by SRNS Manual 1S. See the following for additional information that clarifies the R^2A^2 of the primary members of the Project Team. Also see Appendix J for an organization chart of the Project Team conducting the deactivation.

Project Manager

The PM is directly responsible for all aspects of the deactivation project including planning, execution, maintenance (of deactivation equipment), deactivation operations, engineering, waste management, environmental protection, and safety. The PM is also directly responsible for control of project cost, schedule and performance baselines. The PM functions as the program manager and addresses programmatic issues for the project. The PM receives policy guidance and formal program direction from SRNS management, and works closely with SRNS partners. PM duties and responsibilities include the following:

- Provide guidance and direction to the Project Team.
- Provide work and resource authorization through the Project Team.
- Monitor, review, and report team progress (cost, schedule, and scope).
- Facilitate resolution of SRNS policy and programmatic issues impacting the project.
- Approve project/program documentation.
- Implement the management self-assessment program.
- Communicate with stakeholders and other program interfaces.
- Lead the Project Team.
- Ensure overall project safety.
- Review and approve work packages and procedures.

- Challenge the project to pursue alternatives that reduce risk and could result in "better, faster, cheaper, and safer" solutions to issues impacting the project.

Note the PM may delegate some of the above duties and responsibilities to the Project Management staff.

Deactivation Engineer

The roles and responsibilities of the Deactivation Engineer include the following:

- Provide technical expertise on deactivation means and method.
- Prepare and maintain the Deactivation Project Plan.
- Assist in development of the execution strategy.
- Develop engineering/scoping input for deactivation (e.g., see WBS Nos. 01.29.24.01.06.04, 01.29.24.01.06.05, 01.29.24.01.09.01, 01.29.24.01.10.01, 01.29.24.01.13.03, and 01.29.24.01.14.03)
- Review and approve all deactivation work packages and procedures.
- Assist in "end point" development and validation.
- Ensure applicable engineering standards and procedures are followed.
- Ensure structural integrity of structures, systems and components (SSCs) impacted by deactivation.
- Assist in resolution of programmatic issues related to facility disposition.
- Provide project cognizant engineering.
- Provide regular schedule and progress updates at the "plan of the week" (POW) meetings.
- Support cost estimates, forecasts and trend process.

Design Authority Engineer (also functions as the System Cognizant Engineer)

The roles and responsibilities of the Design Authority Engineer include the following:

- Provide technical experience on assigned SSCs.
- Review and approve work packages that impact assigned SSC.
- Ensure applicable engineering standards and procedures are followed.
- Ensure safety basis compliance with SB through the unreviewed safety question (USQ) process.
- Assist in resolution of programmatic issues.
- Provide cognizant engineering and design authority support.
- Provide engineering support for assigned Building 235-F SSCs.
- Provide configuration control in accordance with area procedures and Manual E7.
- Review and approve design input and design output for deactivation activities that impact assigned SSCs.
- Ensure Building 235-F systems remain operational in support of the PuFF Facility deactivation.

Design Authority Manager

The roles and responsibilities of the Design Authority Manager include the following:

- Direct, manage and oversee the Design Authority Engineers.
- Ensure applicable engineering standards and procedures are followed.
- Ensure safety basis compliance with the SB through the USQ process.
- Assist in resolution of programmatic issues.
- Provide direction and guidance on configuration control and approve Modification Travelers (MTs) for all deactivation-driven "modifications" to Building 235-F.

Fire Protection Engineering/Fire Protection Coordinator

- Prepare and maintain a Modification Fire Hazards Analysis (MFHA).
- Review and approve work packages and procedures that impact or potentially impact fire protection controls and features.
- Prepare and maintain the F-Area Fire Protection Plan and monitor/coordinate its implementation.

Facility Manager/Facility Custodian

The roles and responsibilities of the Building 235-F Facility Manager/Facility Custodian include the following:

- Supervise and lead operations personnel.
- Assist in development of execution strategy.
- Ensure deactivation activities are conducted in a safe and disciplined manner.
- Develop contingency plans to support project needs.
- Review/approve deactivation procedures and Manual 1Y/Construction work packages.
- Assure activities are conducted in a safe and disciplined manner.
- Keep Building 235-F operational and implement required preventive maintenance.
- Perform required surveillances.
- Maintain the Material Balance Account (MBA) and update as required.

Deactivation Manager

The roles and responsibilities of the Deactivation Manager include the following:

- Oversee procedure/work package development and review/approve all deactivation work activities.
- Ensure deactivation activities are conducted in a safe and disciplined manner.

- Obtain resources (personnel, supplies, and equipment) for deactivation field work.
- Identify project trends early, where possible.
- Provide regular schedule and progress updates at the POW meetings.
- Verify/ensure deactivation activities are executed within cost and schedule.
- Authorize and control deactivation activities.
- Assist with development of the execution strategy.
- Validate the completion of deactivation end points.
- Execute deactivation procedures and work packages.
- Verify completion of work packages.
- Support cost estimates, forecasts, trend process.
- Assign and coordinate team leads.
- Coordinate rigging/maintenance/Radiological Control (Radcon) support.

GCO

The roles and responsibilities of the GCO include the following:

- Manage all waste planning, certification, transportation, and final disposition.
- Coordinate waste reduction and minimization activities.
- Characterize waste.
- Certify waste shipments and documentation.
- Procure waste containers.
- Support deactivation activities within cost, schedule, and quality parameters.
- Review and approve all work packages that generate waste.

Industrial Hygienist

The roles and responsibilities of the Industrial Hygienist include the following:

- Perform occupational health hazards assessments of processes, materials, tasks and/or equipment where there is a potential for unacceptable risk to deactivation workers from chemical, physical or biological agents.
- Perform employee exposure monitoring, area and surface sampling, as appropriate for hazardous constituents including asbestos, lead, beryllium, noise, heat stress, and other chemicals.
- Approve work packages, maintenance instructions, and operating procedures for activities involving chemical, physical, biological, or ergonomic hazards.

Safety Engineer

The roles and responsibilities of the Safety Engineer include the following:

- Integrate safety into all phases of the work and with project personnel.
- Ensure safety of project personnel.
- Review and approve all work packages.

Radiological Protection

The roles and responsibilities of the Radiological Protection organization include the following:

- Provide radiological support services and monitoring.
- Implement and establish radiation protection controls.
- Determine appropriate levels of PPE including respiratory protection.
- Post radiologically impacted areas.
- Prepare and approve radiological work authorizations (i.e. Radiological Work Permits (RWPs), As Low As Reasonably Achievable (ALARA) reviews, etc.).
- Calibrate and maintain radiological instrumentation.
- Develop procedures for radiological activities.
- Perform radiological surveys and recordkeeping.
- Review and approve all work packages.

Project Controls (PC)

The roles and responsibilities of the PC organization include the following:

- Provide counsel to the Project Team on cost, funding, and schedule related issues including evaluation and analysis of project reports and status.
- Develop the approach to manage/control project scope, cost, and schedule, to meet the PM's needs.
- Maintain and monitor the cost and schedule baselines (Performance Measurement Baseline) in concert with the scope baseline.
- Coordinate and prepare TPC estimates, Forecasts-at-Completion (FACs), Estimates-at-Complete (EACs), and cost studies/evaluations.
- Support earned value management system (EVMS) implementation and related reporting requirements.
- Assemble and compare (1) Earned Value (EV) against actual costs and planned progress, (2) current schedule progress against the target schedule, and (3) the authorized budget versus the FAC.
- Identify, analyze, and report actual and potential variances to the cost and schedule baselines and FACs. Assist in the development of action plans to mitigate the impact of cost and schedule variances.
- Integrate the performance measurement baseline through identifying and profiling resource needs and funding requirements over time.

- Implement and maintain the Project Trend Program.
- Maintain baseline control through use of a Change Control program.
- Integrate cost and schedule baselines.

5.02 Work Specification and Planning

To achieve the deactivation end state vision (Reference 10.30), the Section 3.0/Appendix E deactivation end points, and the Table 2.4 milestones;[18] the Project Team will execute the following primary deactivation activities:

- Develop and implement SB documents for (1) intrusive activities involving Cells 3-9 and their attached glove boxes, (2) intrusive activities involving Cells 1-2 and their attached glove boxes, and (3) the low inventory state of the PuFF Facility at the conclusion of decontamination, immobilization and material removal activities.
- Prepare Cells 1-9 and their attached glove boxes for decontamination, immobilization, and material removal.
- Develop an innovative, enhanced characterization method and demonstrate the method in Cells 6-9.
- Conduct enhanced characterization of Cells 1-9 and their attached glove boxes before decontamination/immobilization/material removal.
- Develop and implement a waste certification program for TRU waste or revise the current program (see Section 8.02) to include TRU waste generation.
- Conduct decontamination, immobilization and material removal within/from Cells 1-9 and their attached glove boxes.
- Using enhanced characterization, re-characterize Cell 1-9 and their attached glove boxes to establish a final inventory of residual radiological material at project completion.
- Prepare project completion documentation.
- Implement project management and project controls for the duration of the project.

For purposes of work specification and planning, the Project Team established a Work Breakdown Structure (WBS) (see Appendix B) for the above deactivation activities. The WBS has sixty (60) "work packages," which capture and address all elements of the PuFF Facility deactivation. In other words, the work packages include activities for achieving (1) the deactivation end state vision/objective (Section 2.05), (2) all deactivation end points (Section 3.0 and Appendix E), and (3) all project milestones (Table 2.4) assuming deactivation of just the PuFF Facility meets the overall project objective. Each work package is listed in Table 5.1 and further defined by the WBS dictionary in Appendix C.

[18] The deactivation project covered by this Deactivation Project Plan addresses each of the Table 2.4 milestones and includes activities for achieving all milestones.

Table 5.1 – Listing of Work Packages for PuFF Facility Deactivation[19]

WBS #	Work Package[20]	Projected Year
01.29.24.01.06.01	Prepare/Issue Rev. 0 Deact. Safety Basis (1-2)	FY13
01.29.24.01.06.03	Design Prep for Cells 6-9 Work (1-3)	FY13
01.29.24.01.06.04	Design Decon, Cells 6-9 (1-14)	FY13
01.29.24.01.06.05	Design Material Removal, Cells 6-9 (1-14)	FY13
01.29.24.01.06.06	Plan the Deactivation Project (1-1)	FY13
01.29.24.01.07.01	Implement Rev. 0 Deact. Safety Basis and Verify Readiness (1-4)	FY13
01.29.24.01.07.03	Implement Prep for Cells 6-9 Work (1-3)	FY13
01.29.24.01.07.04	Build Mockup (1-3)	FY13
01.29.24.01.08.01	Perform Project Management (1-1, 1-2, 1-3, 1-4, 1-14)	FY13
01.29.24.01.09.01	Prepare Planning Documents for Cells 3-5 (1-11)	FY14
01.29.24.01.09.02	Prepare Designs for Cells 3-5 Deactivation (1-11)	FY14
01.29.24.01.09.03	Prepare Design for D&R of Cell 5 Glove-box (1-14)	FY14
01.29.24.01.09.04	Prepare Design for Breathing Air Distribution (1-11, 1-14)	FY14
01.29.24.01.09.05	Develop Method/Design for Enhanced Characterization, Cells 3-9 (1-9)	FY14
01.29.24.01.10.01	Prepare Planning Documents, Cells 1-2 (1-11)	FY14
01.29.24.01.10.02	Prepare Designs for Cells 1-2 Deactivation (1-11)	FY14
01.29.24.01.11.01	Develop/Implement TRU Waste Handling Program (1-14)	FY14
01.29.24.01.11.02	Develop/Checkout Long-Handled/Extension Tools (1-14)	FY14
01.29.24.01.11.03	Repair/Replace Manipulators for Cells 6-9 (1-14)	FY14
01.29.24.01.11.04	Deactivate Cells 6-9 (1-14)	FY14
01.29.24.01.11.05	Electrically/Mechanically Isolate Cells 6-9 (1-14)	FY14
01.29.24.01.11.06	Install Breathing Air Distribution (1-11, 1-14)	FY14
01.29.24.01.12.01	Perform Project Management (1-5, 1-11, 1-14)	FY14
01.29.24.01.12.02	Perform 235-F S&M in Support of Deactivation (1-11, 1-14)	FY14
01.29.24.01.12.03	Technology Development and Support (1-11, 1-14)	FY14
01.29.24.01.13.01	NUMBER NOT USED	N/A
01.29.24.01.13.02	Develop Method/Design to Isolate Cells 6-9 (1-14)	FY15
01.29.24.01.13.03	Prepare Planning Docs for Decon/Material Removal, Cells 3-5 (1-14)	FY15
01.29.24.01.14.01	Prepare/Issue Rev. 1 Deactivation Safety Basis (1-7)	FY15
01.29.24.01.14.02	Develop Method/Design for Enhanced Char., Cells 1-2 (1-9)	FY15
01.29.24.01.14.03	Prepare Planning Docs for Decon/Material Removal, Cells 1-2 (1-14)	FY15
01.29.24.01.15.01	Upgrade TRU Waste Handling Program for Cells 3-5 (1-14)	FY15
01.29.24.01.15.02	Repair/Replace Manipulators for Cells 3-5 (1-14)	FY15
01.29.24.01.15.03	Implement Prep for Cells 3-5 Work (1-11)	FY15
01.29.24.01.15.04	Perform Enhanced Characterization of Cells 3-5 (1-9)	FY15
01.29.24.01.15.05	Electrically/Mechanically Isolate Cells 3-5 (1-14)	FY14
01.29.24.01.16.01	Implement Rev. 1 Deact. Safety Basis and Verify Readiness (1-8)	FY15
01.29.24.01.16.02	Upgrade TRU Waste Handling Program for Cells 1-2 (1-14)	FY15

[19] FY13 work packages are defined in and funded by BCP Nos. CR13M0033 and CR13M0045. The FY13 work packages are listed here for completeness and to provide users of this plan with an overall understanding of the PuFF Facility deactivation project scope, cost, and schedule. Through completion of the FY13 work packages, the Project Team will achieve the first four milestones (1-1, 1-2, 1-3 and 1-4) listed in Table 2.4.

[20] Except for two FY17 work packages related to project closeout, each work package supports specific Table 2.4 milestone(s). The supported milestone(s) is(are) indicated in parentheses following the title of the work package.

01.29.24.01.16.03	Repair/Replace Manipulators for Cells 1-2 (1-14)	FY15
01.29.24.01.16.04	Implement Prep for Cells 1-2 Work (1-11)	FY15
01.29.24.01.16.05	Perform Enhanced Characterization of Cells 1-2 (1-9)	FY15
01.29.24.01.16.06	Electrically/Mechanically Isolate Cells 1-2 (1-14)	FY14
01.29.24.01.17.01	Re-Characterize Cells 6-9 (1-15, 1-16)	FY15
01.29.24.01.17.02	Implement Method/Design to Isolate Cells 6-9 (1-14)	FY15
01.29.24.01.18.01	Perform Project Management (1-6, 1-7, 1-8, 1-9, 1-11, 1-14, 1-16)	FY15
01.29.24.01.18.02	Perform 235-F S&M in Support of Deactivation (1-8, 1-11, 1-14)	FY15
01.29.24.01.18.03	Technology Development and Support (1-11, 1-14)	FY15
01.29.24.01.19.01	Decon Cells 3-5 and Glove-boxes (1-14)	FY16
01.29.24.01.19.02	Perform Material Removal from Cells 3-5/Glove-boxes (1-14)	FY16
01.29.24.01.19.03	Perform Waste Hand. in Support of Decon/Mat. Rem., Cells 3-5 (1-14)	FY16
01.29.24.01.20.01	Decon Cells 1-2 and Glove-boxes (1-14)	FY16
01.29.24.01.20.02	Perform Material Removal from Cells 1-2/Glove-boxes (1-14)	FY16
01.29.24.01.20.03	Perform Waste Hand. in Support of Decon/Mat. Rem., Cells 1-2 (1-14)	FY16
01.29.24.01.21.01	Perform Project Management (1-10, 1-14)	FY16
01.29.24.01.21.02	Perform 235-F S&M in Support of Deactivation (1-14)	FY16
01.29.24.01.21.03	Technology Development and Support (1-14)	FY16
01.29.24.01.22.01	Prepare/Issue Rev. 2 Deactivation Safety Basis (1-16)	FY17
01.29.24.01.22.02	Prepare/Issue Manual 1C Documentation	FY17
01.29.24.01.23.01	Re-Characterize Cells 1-5 (1-15, 1-16)	FY17
01.29.24.01.23.02	Implement Rev. 2 Deact. Safety Basis and Verify Readiness	FY17
01.29.24.01.24.01	Perform Project Management (1-12, 1-15, 1-16)	FY17

All of the above work packages are geared to the removal/immobilization of residual radiological material from/within the PuFF Facility. As such (and assuming no other process areas require MAR removal/immobilization), the work packages fully support DOE's commitments as outlined in the IP for DNFSB Recommendation 2012-1 (Reference 10.2).

The work packages reflect the following strategies for performing work in the PuFF Facility:

- With one exception (see following bullet), workers will perform decon, immobilization and material removal via existing penetrations (e.g., glove ports and bag-out ports) into and out of the cells and glove boxes. There is no intent to cut/provide larger openings into the cells and glove boxes. This approach best preserves the confinement and exhaust ventilation associated with the cells and glove boxes.
- The Project Team will disconnect the glove box attached to Cell 5 (which was never placed into service and is currently open to the room) so as to install a bag out port in its place. This approach allows for the efficient movement of materials into and out of Cells 4 and 5. (Currently, for those cells, the closest, acceptable bag out port is located in the glove box attached to Cell 3.)

- The Project Team's first preference/priority will be to remove residual radiological material from the cells and glove boxes. Internally-contaminated equipment/components will be decontaminated or removed. As needed, the equipment/components will be disassembled to allow their decontamination and/or removal. The Project Team's second preference/priority will be to immobilize the (difficult to remove or access) radiological material. Immobilization will include the filling of equipment/components with grout or the filling of forms around the equipment/components to allow macro-encapsulation.
- For equipment and components within the cells and glove boxes, the Project Team will develop specifics (e.g., viable alternatives and selection criteria) regarding decontamination, immobilization, disassembly, and material removal as part of several work packages (see WBS Nos. 01.29.24.01.06.04, 01.29.24.01.06.05, 01.29.24.01.13.03 and 01.29.24.01.14.03 with Appendix C). Technologies specified in Table 5.4 (Section 5.8) are those technologies currently under consideration by the Project Team, and those technologies will act as a starting point for the planned development of specifics. Note that the lighting of cells/glove boxes and the cleaning of shield windows must precede the Project Team's effort.
- The Project Team will put select manipulators back into service in support of efficient decontamination, immobilization and material removal. See Reference 10.31 for additional information regarding which manipulators the Project Team will repair and/or replace. In general, the Project Team will use manipulators rather than robotic arms due to the added expense for the robotic arms as compared to the manipulators' repair/replacement. The Project Team may use a robotic arm if the manipulators do not have sufficient lifting capacity and the Project Team can identify no other means to lift/move an in-cell component.[21]
- The Project Team will not use the services and utilities (e.g., lighting and electricity) that reside and terminate within the cells and glove boxes. Those services and utilities will be isolated prior to work that is intrusive to the cells and glove boxes.
- The E1 fans will remain operational (and connected to all cells and glove boxes) throughout decon, immobilization and material removal. This approach recognizes that the existing system is the most reliable and robust method for exhausting air from the cells and glove boxes (i.e., use of the existing ventilation is preferred over the use of temporary ventilation installed by the Project Team).
- The Project Team will conduct work in less contaminated cells before proceeding to more contaminated cells and glove boxes. The Project Team can then demonstrate techniques and approaches for

[21] Should the Project Team need a robotic arm, then the Project Team would need to process a BCP for the added scope to design, obtain and install a robotic arm. (The use of a robotic arm is not within the project's baseline scope, cost, and schedule.)

decontamination, immobilization and material removal as well as hone worker skills in a less risky environment. In practice, this means that the Project Team will first work in Cells 6-9, and then proceed to Cells 3-5 and their attached glove boxes. Upon the completion of work in Cells 3-5 and their attached glove boxes, the Project Team will conduct work in Cells 1-2 and their attached glove boxes.

- Although the Project Team will initially conduct work in Cells 6-9, the initial "deactivation" BIO/TSR will cover Cells 3-9 and their attached glove boxes. The Project Team expanded the initial "deactivation" BIO/TSR to include Cells 3-5, because those cells/glove boxes have radiological inventories similar to Cells 6-9.
- No work packages are geared to the large-scale D&R of the PuFF Facility cells and glove boxes. The Project Team anticipates that it can achieve the desired risk reduction using just decontamination, immobilization and material removal.[22] The Project Team will immobilize radiological inventory in select components that cannot be adequately decontaminated or removed from the cells and glove boxes.

5.03 Baseline Cost

In accordance with Manual 6B, Procedure 1.4 (Reference 10.5) and SRNS's Estimating Guideline Manual (WSRC-IM-95-7, Reference 10.32), the Project Team analyzed each of the work packages listed in Table 5.1 so as to identify the resources (in terms of labor and materials) needed for the execution of each work package. Site Estimating used the team's analysis to develop a formal cost estimate for the deactivation project (Reference 10.33). The cost estimate provides a fully-burdened TPC for the deactivation project. The following table summarizes the fully-burdened cost by FY (assuming the work packages are worked per the "projected year" identified in Table 5.1 and Appendix G).

Table 5.2 – Total Project Cost by FY[23] (Costs are current, but subject to change as the deactivation project progresses.)

FY	Fully-Burdened Cost ($K)
14	21,000
15	22,000
16	17,000
17	5,000
Total	65,000

The costs (and schedule) for the PuFF Facility deactivation are based on the following inputs and assumptions:[24]

[22] Material removal includes the removal of loose components and the D&R of select components (using hand and power tools but not hot work) that cannot be decontaminated.
[23] See BCP Nos. CR13M0033 and CR13M0045 for FY13 costs associated with the PuFF Facility deactivation.
[24] See Reference 10.33 for additional inputs and assumptions applicable to the estimation of costs.

- The risk reduction activities are considered deactivation subject to Manual 1C, Procedure 301 (Reference 10.24). The risk reduction activities, because they do not take the building to a final end state or bias the selection of a final end state, are not subject to CERCLA.
- Deactivation (i.e. risk reduction activities including decontamination, immobilization, and material removal) will be performed in accordance with an approved Deactivation Project Plan prepared in accordance with Manual 1C, Procedure 302 (Reference 10.4).
- A National Environmental Policy Act (NEPA) review yields a Notice of NEPA Approval (NONA) based on an applicable categorical exclusion. No permitting per se is required for the deactivation effort.
- Estimated costs include ½ of the cost for S&M activities (i.e., S&M costs are shared with the Building 235-F owner). Examples of S&M activities/costs include rounds, maintenance of installed systems (e.g. ventilation, electrical distribution, backup diesels, etc.), and electricity.
- Estimated costs include efforts to complete the Building 235-F PuFF Facility deactivation BIO/TSR and related documents. The Building 235-F PuFF Facility deactivation BIO/TSR are needed to support the implementation of deactivation activities identified within this plan.
- Per SRNS Manual 1S, Chapter 7 (Reference 10.34), waste container loading is restricted to less than 80 PEC per 55 gallon drum and less than 130 PEC per Standard Waste Box.[25] The Project Team will seek a "deviation" to these restrictions so as to increase containing loading (e.g., for both waste containers, 500 PEC applies). When formulating the deactivation project's baseline scope, cost, and schedule; the Project Team assumed the deviation is approved. (See additional discussion in Section 8.02.)
- Wastes will be packaged and shipped to Solid Waste (possibly hazardous, TRU, TRU mixed and low-level wastes). TRU and LLW are forecasted, while TRU mixed and hazardous waste(s) may or may not be encountered.
- The residual radiological material inside the PuFF Facility glove boxes and cells is in the form of sub-micron particles that are very mobile if released. To prevent releases and to mitigate subsequent exposures, the Project Team will make extensive use of temporary containments, temporary ventilation, and breathing air for those deactivation activities that are intrusive to the PuFF Facility cells and glove boxes.

Preparatory activities such as initial BIO/TSR development/implementation, NEPA review and deactivation project plan development, are assumed to be completed in FY13. Other preparatory activities, such as the remediation of shield windows, the activation of glove ports and the installation of temporary lighting, are also assumed to be completed in FY13 for Cells 6-9 and in FY 15 for Cells 1-5 and their attached glove boxes. To simplify cost estimating and

[25] PEC = Plutonium Equivalent Curies. See Section 8.02 for a discussion of PEC versus grams of Pu-238 per container.

scheduling; the decontamination, immobilization, and material removal activities are assumed to primarily occur in FY14 for Cells 6-9 and in FY16 for Cells 1-5. Closeout activities (characterization, demobilization and reporting) are assumed to be completed in FY17. See Appendix G for an overall schedule for the PuFF Facility deactivation.

5.04 Baseline Schedule

The Project Team developed a summary baseline schedule for the deactivation project in accordance with Manual 6B, Procedure 1.4 (Reference 10.5). See Appendix G for the summary baseline schedule, which is based on the schedule logic of Appendix H and anticipated out-year funding.

To develop the summary baseline schedule, the Project Team first analyzed the work packages (and their sub-tier activities) listed in Appendix B and defined in Appendix C. That analysis established durations for each work package and its sub-tier activities. The analysis also established the resources to accomplish each work package and its sub-tier activities. The Project Team loaded the durations and resources into P6 along with the applicable project milestones from Table 2.4. Within P6, all work packages and sub-tier activities were logic-tied so as to generate an integrated, resource-loaded, summary baseline schedule (nominally a "Level 3" schedule) for the deactivation project.

Using P6 and the Level 3 schedule in P6, the Project Team will establish a more detailed schedule (nominally a "Level 5" schedule) for the deactivation project. The Project Team will review and update this Level 5 schedule on a weekly basis. In that manner, the Project Team will track progress and communicate project needs on a weekly basis. During the development and maintenance of either the Level 3 or Level 5 schedule, the Project Team will use the Critical Path Method (CPM) to determine which activities and milestones are critical to the project schedule. Then, the Level 5 schedule will identify float for non-critical activities and will identify those activities that lay on the "critical path" and that have an impact on project milestones. The Project Team will use the Level 5 schedule to track progress for all milestones identified in Table 2.4.

The Project Team will "code" all project activities in P6 so that the Project Team can perform the following activities if required:

- Status the Level 3 schedule for the deactivation project.
- Transfer activities (for support groups and facility management) to the POW/plan of the day (POD) schedules for F-Area Operations.
- Status the SRS Site Summary Schedule (or Master Schedule) for the Management & Operation (M&O) contract scope.
- Provide schedule and resource information to Cobra (a cost processing software used by SRNS), which maintains the "EVMS schedule" for the deactivation project.

The Project Team will maintain the following EVMS parameters for the deactivation project:

- Budgeted Cost of Work Scheduled (BCWS)
- Actual Cost of Work Performed (ACWP)
- Budgeted Cost of Work Performed (BCWP)
- Cost Performance Index (CPI) or Cost Variance (CV)
- Schedule Performance Index (SPI) or Schedule Variance (SV)

The Project Team will use SPI and SV to measure schedule progress with respect to the summary baseline schedule. Should the summary baseline schedule need revision/adjustment, the Project Team will make changes in accordance with Manual 6B, Procedure 7.1 "M&O Change Control Process" (Reference 10.35).

5.05 Performance Measures and Progress Metrics

In accordance with Manual 6B, Procedure 1.5 (Reference 10.36), the Project Team will implement an EVMS. Using the EVMS, the Project Team will measure performance and progress with respect to cost and schedule. The EV, known as BCWP, is based on the baseline value and completion status of work packages and their sub-tier activities. (See Appendix B for a listing of work packages and their sub-tier activities, and see Appendix C for a definition of work packages and their sub-tier activities.) To the extent practical, the completion status of work packages will be linked to the physical completion of sub-tier activities so as to determine the percent complete of work packages whenever possible. On a weekly basis, the Project Team will update the Level 5 schedule within P6. As discussed in Section 5.04, P6 will provide schedule information to Cobra, which maintains the "EVMS schedule" for the deactivation project. In turn, Cobra will process project costs/schedule and will provide the Project Team with performance measures and progress metrics such as CPI, CV, SPI and SV. For "project management" work packages (e.g., WBS #01.29.24.01.12.01), the Project Team will make use of the "level of effort" EV method to track work progress activities because discrete tasks cannot be readily defined and/or measured.

Via Cobra, the Project Team will establish Control Accounts for the deactivation project. (See Appendix B for an initial listing of Control Accounts.) The PM will be responsible for managing the work associated with the Control Accounts and will delegate or serve as the Control Account Manager(s) (CAM) for the accounts. The CAM will analyze costs and schedules at the Control Account level using BCWP, BCWS, ACWP, CPI, SPI, SV and CV.

The CAM will ensure actual charges against the Control Accounts are correct, have any incorrect time charges changed, and review major accruals. Also, on a weekly basis, the CAM will update schedules and additional EV reports that identify progress of discrete work activities. This reported progress will be used to calculate the BCWP for the CAM's accounts. Further, the CAM will analyze

performance measurement variances,[26] accurately forecast costs, and identify trends that impact the Control Accounts. Project Controls will assist the CAM and PM with appropriate reports and guidance. Specifically, Project Controls will issue routine reports containing hours charged against the Control Accounts, for the previous week, and will provide a monthly report identifying expended resources (labor, materials and subcontracts) to the CAM.

The project will evaluate the FAC on an on-going basis. As part of the evaluation, the CAM will consider the current schedule, all trends, approved BCP(s), actuals, and encumbrances (materials and subcontract commitments). Using the FAC, the CAM and Project Controls will continually assess the FY expenditures and forecast funding requirements for the project for the FY. Any change to FY funds availability will be evaluated for impact to the project and will be documented in a project trend, if needed. On an annual basis as a minimum, the CAM and Project Controls will prepare a comprehensive EAC, which will be approved by the PM and the Project Controls manager. (See SRNS Manual 6B, Procedure 5.2 (Reference 10.37) for additional details regarding the EAC process to be employed by the Project Team.)

The CAM will conduct variance analysis and reporting in accordance with SRNS Manual 6B, Procedure 1.6 (Reference 10.38) for all Control Accounts. As required, the CAM will prepare Variance Analysis Reports (VARs) and Corrective Actions Plans for Control Accounts that exceed the established thresholds. As a minimum, the VAR will contain a narrative of the cost or schedule variance, a description of impacts to cost/schedule baselines and milestones, and a description of corrective actions being taken. Corrective actions will be tracked in the variance analysis corrective action item log. Project Controls will assist the CAM with detailed analysis, and provide other assistance as needed.

In accordance with Manual 6B, Procedure 7.1 (Reference 10.35), the Project Team will make changes to the scope, cost and schedule baselines through the use of BCPs.[27] All members of the Project Team are responsible for identifying changes (which impact scope, cost and schedule baselines) and forwarding changes to the CAM. The CAM will work with Project Controls to manage/implement the BCP process at the request of the PM. The PM will be responsible for determining which changes qualify as potential baseline changes in accordance with the criteria set forth in Manual 6B, Procedure 7.1 (Reference 10.35). Project Controls will maintain a baseline change log that keeps a running total of the execution baseline, based on approval of each baseline change. (A log showing pending baseline change impacts will also be maintained). Once a BCP

[26] See SRNS Manual 6B, Procedure 1.6 (Reference 10.38) for additional details regarding variance analysis and reporting by the CAM.
[27] For emergency/abnormal conditions where immediate change is needed, the Project Team will prepare/process "emergency change notices" (ECNs) in accordance with Manual 6B, Procedure 7.1 (Reference 10.35).

is approved, Project Controls and the CAM will update the detailed baseline schedule and the detailed BCWS in P6 and Cobra.

The Project Team will implement a Project Trend Program in accordance with Manual E11, Procedure 2.15 (Reference 10.39). The program will be initiated upon approval of the baseline budget. The Project Trend Program provides the Project Team with early identification and warning of potential changes to the scope, cost or schedule baselines, with the objective of mitigating the impact of identified negative events and maximizing the benefit of positive events. Any member of the Project Team may identify trends. Project Controls will coordinate the development of a rough order of magnitude estimate and schedule impact evaluation relative to the current trend base with the applicable impacted organizations. Project Controls will log trends and maintain their status. Project trends will be regularly reviewed (at least monthly). The PM will determine which "scope only" trend changes are significant, which trends are resolved, and the proper path forward (no action, funding only, baseline change, etc.) for identified trends.

The annual BCP, approved at the beginning of each FY, acts as "work authorization" for the work packages that support the overall deactivation project.[28] When the BCP is approved, the PM will authorize/direct the Project Team to execute the funded work packages, typically through the POW meeting and the Level 5 schedule. Any other field work will be authorized via the PM approval (and Facility Management approval) of a procedure, Manual 1Y work package, or Construction work package. Material and subcontract work is authorized based on the PM's, or his designees', approval of the purchase requisition.

Project Controls, acting in the capacity as the agent for the CAM, notifies the Chief Financial Officer Division when to activate or close the appropriate activity codes (i.e., "speed charts"). The Project Team will use the existing M&O accounting system, which relies on and implements the Integrated Budget, Accounting and Reporting System (IBARS).

5.06 Configuration Management

Although all radiological processes are shut down, many SSCs within Building 235-F remain operational in support of S&M and deactivation. In general, these SSCs remain operational because (1) they confine the residual radiological material within the various process areas, (2) they detect abnormal/emergency conditions that could result in a release, or (3) they allow workers to monitor the building so as to detect abnormal/emergency conditions that could result in a release. For example, exhaust ventilation (system acronyms = GBEX for exhaust from cells/glove boxes and RREX for room exhaust) remains operational because

[28] See Table 5.1 and Appendix B for a listing of work packages along with projected year of authorization for each work package.

it provides confinement. As another example, the fire detection and alarm system (system acronym = FDAS) remains operational because it provides for detection of a fire, an emergency condition. As a final example, the electrical distribution (system acronym = ELLV or ELNH) remains operational so as to provide power to supply fans, exhaust fans, radiological monitoring equipment, lighting, etc.

Due to the risk associated with the residual radiological material, the SB for Building 235-F (both the current S&M BIO/TSR and the future deactivation BIO/TSR (References 10.11 and 10.18 through 10.20)) require certain SSCs to remain operational. For other SSCs, the SB requires certain design features to be preserved. The SB credits these systems/design features because they prevent and/or mitigate accidents that impact facility and co-located workers. As such, the SSCs have a functional classification of "safety significant" (SS) or are considered "defense-in-depth/important to safety" (DID/ITS).[29] For these credited SSCs that ensure acceptable risk, the SB requires F-Area Operations to maintain a "Configuration Control Program" (e.g., see Section 5.7.2.6 of Reference 10.18).

Because it is required by the S&M BIO/TSR, F-Area Operations/Engineering already has a Configuration Control Program in place for Building 235-F. The Project Team will work within this established program. Along those lines, the Project Team will perform the following activities during the deactivation project:

- Brief the Design Authority Manager on planned deactivation work.
- Forward all scoping documents to the Design Authority Manager for review and approval.
- Per the Design Authority Manager's direction, prepare and implement MTs for facility "modifications" in accordance with Manual E7, Procedure 2.05 (Reference 10.40). (Per procedure, the Design Authority must approve all MTs.)
- Ensure the Design Authority approves all designs that result from the MTs.
- Forward all procedures and work packages to 235-F Facility Management, who will approve/authorize all work within Building 235-F.
- Forward all procedures, work packages and designs to the Design Authority Manager for USQ determinations in accordance with Manual 11Q, Procedure 1.05 (Reference 10.41).
- As required by Manual 1B, Procedure 4.19 (Reference 10.42), forward deactivation documentation to the F-Area FOSC for review and approval.

From a practical perspective, most deactivation activities will not require configuration control because they do not impact an operating SSC or a credited design feature. Notable exceptions include the following:

[29] See Manual E7, Procedure 2.25 (Reference 10.43) for additional information regarding functional classification.

- The configuration of glove ports will be controlled (via drawings and procedures) because they act as confinement for cells and glove boxes. Note that the Project Team will re-install gloves/clear tubes/special inserts in place of the existing blind flanges.
- The configuration of bag out ports will be controlled (via drawings and procedures) because they act as confinement for cells and glove boxes. Note that the Project Team plans to place the bag out ports back into operation and that a new bag out port is planned for Cell 5.
- The configuration of the cells' shield windows will be controlled (via drawings) because they act as confinement for cells and glove boxes. Note that the Project Team will partially D&R the cells' shield windows so as to allow cleaning of the inner panes.
- The isolation of electrical circuits (to cells and glove boxes and their support equipment) will be controlled (i.e., single-line diagrams will be updated) because electrical distribution remains operational and so as to support the control of hazardous energy.

Existing controlled documents (such as drawings, data files, calculations, specifications, purchase orders and related documents, vendor-supplied documents, procedures, etc.) will be handled and used in accordance with the provisions of SRNS Manual 1B, MRP 3.32, "Document Control" (Reference 10.44) to ensure the latest revision is being used to perform work. Records generated by the project participants will be handled, identified, and stored in accordance with SRNS Manual 1B, MRP 3.31, "Records Management" (Reference 10.45).

5.07 Risk Management[30]

Introduction

The Project Team recognizes that risk management is an essential element of project management. During the deactivation project, the Project Team will apply the risk management principles of DOE O 413.3B as appropriate for the planned deactivation, which will be managed as a "Category 5 operational activity," with cost and performance information reported under PBS-11C. This section of the Deactivation Project Plan describes the R&O Management process that the Project Team will apply to the deactivation project.

The primary output of the R&O Management process is an R&O Analysis Report (ROAR), which documents the results of R&O assessments and which provides the Project Team with strategies and actions to mitigate identified risks or to take advantage of identified opportunities. The Project Team will conduct R&O assessments to identify potential events that may be detrimental or beneficial to the task. R&Os are identified and documented throughout the year and then either annually or biennially a formal assessment is performed and documented in

[30] See SRNS Manual 14B for additional information regarding R&O Management and for a glossary of terms that are specific to R&O Management.

a report. In addition to the identification of the R&Os, handling strategies are developed that potentially reduce the likelihood of the occurrence and/or lessen the impact for risks and in the case of opportunities, potentially increase the likelihood that the opportunity will occur and/or improve the benefit of occurrence. The Project Team will record all information captured during the R&O assessments in a database.

Process

The R&O Management process is described in Manual 14B, Section 2.0 (Reference 10.46), which is applicable to "projectized" tasks such as the PuFF Facility deactivation. For technical and programmatic (T&P) risks, the overall R&O Management process is shown in Figure 5.1. Summarily, the essential steps are:

- Identification
- Assessment
    - Grading
    - Handling
    - Impact Determination
- Integration
    - Monitoring
    - Reporting

Identification includes, but is not limited to, review of assumptions, Subject Matter Expert (SME) input, review of previous R&O assessments, and brainstorming. "Assessable Elements" also help to provide focus and capture areas of concern. Assessment includes the assignment of likelihood and consequence to R&O's and impact determinations. Likelihood and consequence tables are developed specific to the deactivation project. R&Os are given the level of High, Moderate, or Low position dependent on the risks and/or opportunity matrixes. Likelihood and consequence tables, Assessable Elements, and matrixes used in the process are provided in the ROAR. Integration involves integrating risk handling impacts into cost and schedule and includes monitoring and reporting.

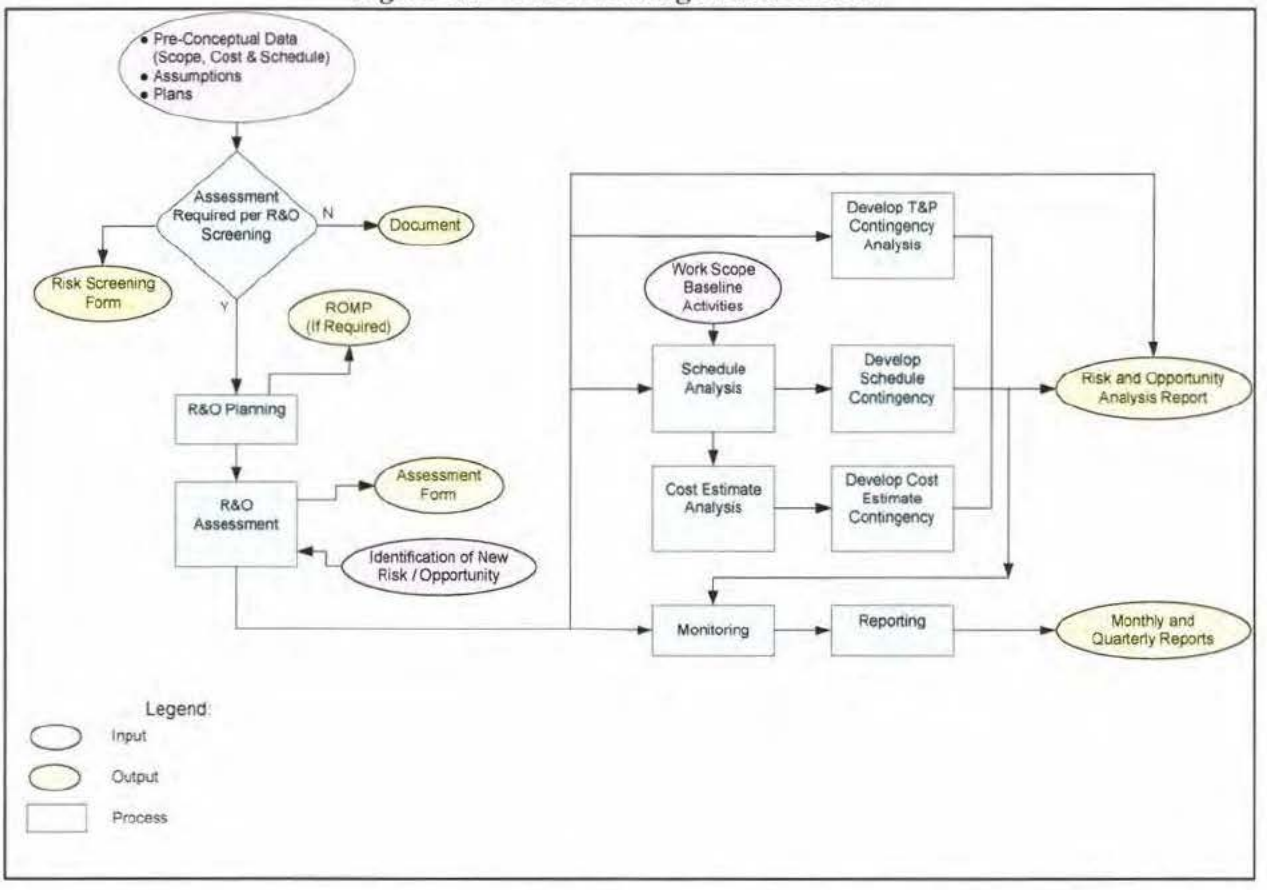
Certain categories of risk are **not** included in the R&O assessments or in the risk-based cost contingency analyses because they are considered to be outside the scope of work and if they occur, a BCP will be processed. These categories of risks include:

- Force Majeure – This category includes cost and schedule impacts as a result of events that are outside the control of the Federal Program Manager or the associated Organizations. These events are limited to 'acts of God', (i.e., severe weather, flood, storm), industrial accidents, and fire.
- Adverse Funding Changes from Original Authorization – This category includes cost impacts due to adverse changes in the authorized funding

profile, which originate external to DOE. Budget reductions are a fact of life in Federal projects and are not considered as project risks. However, cost impacts due to funding delays that typically occur in the first quarter of each fiscal year should be included in the risk analyses and contingency calculations, if they are applicable.

- New or Revised Scope – This category includes changes to the technical scope of the Subprogram impacting Subprogram functions and/or major objectives.
- New or Revised Baseline Requirements – This category includes changes to baseline, top-level organization performance, and design requirements as defined in the Deactivation Project Plan.

Figure 5.1 R&O Management Process



An integrated Project Team is an integral component of the R&O Management process. Table 5.3 lists the key positions for implementation of the R&O Management process along with the primary responsibilities for each position.

Table 5.3 – Key Positions and Responsibilities for Risk Management

Position	Responsibility
Risk Management Authority (RMA)/Project Manager	• Assign Risk Management Lead (RML) and Assessment Facilitator for scheduled risk assessments • Approve Risk Assessment Plan and ROAR • Review Cost and Schedule Baselines to ensure actions to implement handling strategies are incorporated • Prepare BCP(s) for handling actions outside baseline • Present R&O status information at Senior Management Review
RML and Assessment Facilitator	• Prepare planning documentation • Identify baseline assumptions and planning basis • Plan and schedule assessments • Determine scope and assessable elements • Establish likelihood and consequence/benefit criteria for R&O grading • Select monitoring and statusing process • Select R&O Assessment Team and support personnel • Provide R&O Assessment Team with planning data • Prepare a monthly R&O Status Report • Prepare input for the Senior Management Review
RML	• Review activity assessment data • Assist Risk Owner with BCP preparation • Review handling actions
R&O Assessment Team, with Facilitator *(Note: RML is considered an automatic Team member and the Team Lead)*	• Identify R&Os (includes any received from outside the Project Team) • Grade R&Os • Select handling strategy • Determine cost and schedule impact of implementing R&O handling strategy • Develop three point cost estimate (Best, Most Likely, Worst Case Values) for residual risks • Develop three point schedule estimate (Best, Most Likely, Worst Case Values) for residual risks • Review ROAR
Assessment Facilitator	• Capture activity assessment data in the "R&O Register" • Prepare and submit ROAR for review and approval • Submit assessment data for review and approval
Risk Owner	• Identify actions to implement handling strategies • Assign actions, with schedule • Transmit handling actions and schedule to Project Controls • Review cost and schedule baselines to ensure actions to implement handling strategies are incorporated • Review ROAR
Project Controls	• Incorporate handling actions into cost and schedule • Issue cost and schedule baseline revision • Incorporate T&P risk assessment (T&PRA), management reserve (MR) and contingency into estimate summary • Assess schedule for risk (uncertainty) • Incorporate uncertainty risk into activity schedule • Input T&PRA residual risk schedule impact information into activity's schedule baseline and develop new schedule • Calculate schedule MR and contingency • Transmit schedule MR and contingency data to Assessment Facilitator for incorporation into ROAR • Add schedule-based contingency cost values and T&PRA values in activity estimate summaries to estimate transmittal and documentation • Transmit estimate summary MR and contingency to Assessment Facilitator for inclusion into ROAR

The Project Team completed an initial R&O assessment so as to identify potential events that may be detrimental or beneficial to the deactivation project. Those events along with associated likelihood, consequence and handling strategy are summarized in Appendix J. Site Estimating subsequently used the initial R&O assessment to establish contingency for the deactivation project as part of the formal cost estimate (Reference 10.33).

5.08 Application and Development of Technologies

The Project Team evaluated the planned deactivation activities, and identified technologies applicable to each activity. The following table summarizes the results of the evaluation. In general, proven technologies are available for each activity. A notable exception is the final characterization of the cells and glove boxes. For this activity, the Project Team will develop and deploy a method of enhanced characterization (see WBS No. 01.29.24.01.09.05 within Appendices B and C).

Table 5.4 – Technologies to Be Applied to the PuFF Facility Deactivation

Activity	Technology Available?	Discussion
"Gross" Decontamination of Cells and Glove Boxes	Yes	There are several proven methods for "gross" decontamination of the cells and glove boxes including (1) sweeping/brushing, (2) scraping, (3) sanding, (4) vacuuming, and (5) wet/dry wiping. The Project Team will likely use all of these methods to decontaminate the cells and glove boxes. Because the residual radiological inventory is so large, these "gross" methods will likely have the greatest impact on lowering the inventory of residual radiological material within the cells/glove boxes. The deactivation project includes time and resources for the design and prove-out of small HEPA-filtered vacuums (e.g., see WBS No. 01.29.24.01.11.04). This activity is considered an adaption of existing technologies rather than the development of new technologies.
"Fine" Decontamination of Cells and Glove Boxes	Yes	There are several proven methods for "fine" decontamination of the cells and glove boxes including (1) non-flammable strippable coatings and (2) mild acid wash. The Project Team will likely use both methods and has identified a specific non-flammable decontamination gel that has proven successful in similar applications (Reference 10.23).

Material Movement within Cells	Yes	The handling and movement of materials (including decontamination gels) within the cells is probably the most difficult activity for deactivation workers due to the limited number of (small) openings into the cells. The workers will use long-handled/extension tools at glove ports along with select manipulators to handle and move material. Although difficult and awkward, these methods are judged to be adequate based on past experience with the repair and maintenance of equipment within the cells. The deactivation project includes time and resources for the design and prove-out of various long-handled/ extension tools (see WBS No. 01.29.24.01.11.02). This activity is considered an adaption of existing technologies rather than the development of new technologies. The manipulators have limited lifting capacity. Therefore, the Project Team will upgrade certain manipulators for cells where heavier loads are anticipated (e.g., Cell 1). The deactivation project includes time and resources to make the upgrades. Should the Project Team encounter loads that (1) exceed the upgraded manipulators, (2) cannot be moved by other means, and (3) cannot be left in place; then the Project Team will make use of robotics arms, which is considered a proven technology that just needs to be adapted to the cells. Coupled with "gross" decontamination, the activity likely has the greatest impact on lowering the inventory of residual radiological material because the inventory likely resides in/on components (e.g., containers and crucibles) used in the production process and present in the cells.
Material Movement within Glove Boxes	Yes	No specific technology is needed for the handling and movement of materials within the glove boxes. The glove boxes are fitted with multiple glove ports that allow workers to reach almost the full volume of the glove boxes. As needed, the Project Team will fabricate and deploy long-handled/extension tools to reach all spaces within the glove boxes.
Immobilization	Yes	The Project Team, supported by SRNL, has extensive experience with the immobilization of radiological material using inorganic grouts (e.g., grouts that use Portland cement and various aggregate). Various grouts were identified and deployed in the decommissioning of P and R-Reactors along with the C-Reactor Disassembly Basin. The Project Team will use these grouts to immobilize residual radiological material in components that are difficult to decontaminate and difficult to disassemble and remove. As needed, forms can be placed around components so as to allow their macro-encapsulation.
Waste Handling	Yes	No specific technology is needed for the handling and management of wastes. Methods for assaying, packaging and transporting both LLW and TRU waste are already available and proven.
In-Process Characterization	Yes	No specific technology is needed for in-process characterization (e.g., to establish decontamination factors). The Project Team will use established SRNS Manual 5Q methods for swiping and probing surfaces for radiological material. Although not critical to project success, the Project Team may use various "mapping" technologies that are available and proven. Note that the Project Team considers those mapping technologies of limited benefit because the sub-micron Pu-238 is highly mobile. The mapping provides a snap shot of the cells/glove boxes, but that snap shot likely changes as soon as there is intrusive activity that disturbs the environment within the cells/glove boxes.

Final Characterization	No	The Project Team will develop a method for "enhanced" characterization (see WBS No. 01.29.24.01.09.05) and will implement the "enhanced" characterization methodology before work in Cells 1-9 (also see WBS Nos. 01.29.24.01.15.04 and 01.29.24.01.16.05) and after work in Cells 1-9 (see WBS Nos. 01.29.24.01.17.01 and 01.29.24.01.23.01). Previous characterization made use of proven technology (e.g., sodium iodide detectors), which yielded large uncertainties due to limits on positioning the instrumentation. Thus, improvements in positioning appear to have the greatest impact on characterization. Along these lines, the Project Team plans to modify the proven technology so that it can be introduced directly to the cells or at least positioned within the cells via "clear tubes." Further, the Project Team will seek to improve the collimation associated with the proven technology so as to limit the "field of view" and thus reduce uncertainty associated with discrete measurements. Note that the Project Team, working through SRNL, is pursuing funding from EM-13 for identification/ development of enhanced characterization methodologies/equipment.
Worker Protection	Yes	No specific new technology is needed for worker protection. The Project Team will make use of proven methods (in accordance with SRNS manuals and procedures (see listing in Section 11.0)) for protecting workers from exposure to radiological material and industrial hazards (e.g., existing exhaust ventilation, air monitors, negative pressure instrumentation, smoke testing, supplied air hoods/suits, respirators, and various PPE including gloves, coveralls, hoods, booties, glasses, toe protection and gloves when handling containers/materials, etc.). See Table 7.1 for additional information regarding hazard control and worker protection.
Radiological Containments	Yes	No specific new technology is needed for radiological containments, which include the use of temporary ventilation. The Project Team will make use of proven designs and methods for the fabrication, installation, operation, and maintenance of containments, wind breaks, glove-bags, etc. Note that the Project Team will use the existing process ventilation system to maintain negative pressure within PuFF Cells 1-9 and their attached glove boxes. Use of the existing ventilation provides for the control airborne contamination during decontamination, material removal and immobilization activities.

The Project Team identified several technologies that might improve the efficiency/effectiveness of a deactivation activity and/or reduce risk of worker exposure. The Project Team, with support from SRNL, will investigate these technologies, which are listed as follows:

- Equipment/instrumentation that uses electrostatic forces to capture and immobilize airborne contamination (could be coupled with a fan and placed in a cell/glove box to "semi-passively" (i.e., minimum worker involvement) clean the cell/glove box over time)
- Waste bags whose exteriors are electrostatically neutral or repulsive so as to facilitate decontamination; alternatively, waste bags whose interiors are electrostatically neutral or attractive to keep contamination contained with the bag
- Real-time, hand portable radiation mapping device, which supports in-process characterization

- Non-combustible fixatives that could be applied to interior surfaces of the cells and glove boxes.

Note that current (FY13) SRNL support for the deactivation project is primarily funded through the DOE EM-13 Office of Deactivation and Decommissioning and Facility Engineering under Technical Task Plan (TTP) SRO91701. SRNL is the Principal Investigator and Technical Lead for coordinating technology development activities funded by TTP SRO91701. SRNL support in FY14, FY15 and FY16 are; however, activities within this Deactivation Project Plan (see WBS Nos. 01.29.24.01.12.03, 01.29.24.01.18.03 and 01.29.24.01.21.03 within Appendices B and C). In addition to their investigation of the technologies listed above, SRNL will provide technical support of decontamination, immobilization, material removal, and other emergent issues as identified by the Project Team.

6.0 Regulatory Considerations

The primary environmental regulator for SRS is SCDHEC, although the EPA retains Federal enforcement authority for all statutes. Building 235-F releases to air and surface water comply with existing permits issued by SCDHEC. Required permits or permit modifications for deactivation activities will be identified and will be obtained through normal permitting mechanisms. No other environmental permits are currently in place for Building 235-F. Appropriate regulator interactions will be maintained during deactivation. The deactivation project includes the appropriate disposal of all removed hazardous or radioactive waste.

6.01 National Environmental Protection Act (NEPA)

The NEPA requires that major Federal actions be reviewed for possible environmental impacts. The Project Team has completed the required review and determined that the PuFF Facility deactivation fits within one of the Categorical Exclusion (CX) typical classes of action described in the 10 CFR 1021, Appendix B to Subpart D (Reference 10.47).

In accordance with Manual 3Q, Procedure 5.1 (Reference 10.48), the Project Team prepared an Environmental Evaluation Checklist (EEC) for the PuFF Facility deactivation. The EEC was processed by SRNS and DOE. During processing, the deactivation was categorically excluded from further NEPA documentation and a Notice of NEPA Approval (NONA) was issued for the deactivation (Reference 10.49). No further NEPA documentation will be required for the PuFF Facility deactivation.

6.02 Resource Conservation and Recovery Act (RCRA) / CERCLA

6.02.01 Current RCRA/CERCLA Status

With one exception, there are no RCRA treatment, storage or disposal facilities or CERCLA sites at or near the Building 235-F Complex. There is a Site Evaluation Area, OU563, directly outside the north wall of Building 235-F, which is associated with the process sewer system.

During deactivation, materials will be removed, segregated, containerized and transferred to interim storage/staging and disposal. Materials intended for discard that contain RCRA hazardous constituents above their respective regulatory level will be managed in accumulation areas (satellite accumulation areas or staging areas) in accordance with the SRNS Manual 3Q, Section 6.0 (Reference 10.50).

The following types of potentially hazardous wastes have been initially identified in Building 235-F, but not necessarily within the PuFF Facility:

- Lead (e.g. lead-acid batteries, lead shielding, brass components, circuit boards, cathode ray tubes, and paint)
- Cadmium (e.g. nickel-cadmium batteries that are radiologically-contaminated above unconditional release criteria and circuit boards)
- Mercury (e.g. radiologically-contaminated fluorescent bulbs, and switches)
- Due to the age of the facility, electrical components and paint containing polychlorinated biphenyls (PCBs) are likely present in Building 235-F.

6.02.02 Deactivation Strategy for Waste and PCBs

During the deactivation project, the Project Team will remove both Pu-238 contaminated process-related equipment and non-Pu-238 chemical systems from Building 235-F, ensuring that no hazardous material will be stored in lieu of disposal. Draining activities (i.e., absorption, etc.) may generate new secondary wastes. Other new secondary wastes may be generated as piping or equipment is removed.

The Project Team will manage wastes generated during the deactivation project in accordance with SCDHEC/EPA environmental regulations, SRNS Manual 3Q, Section 6.0 (Reference 10.50), and SRNS Manual 1S, Chapter 6.0 (Reference 10.51) & Chapter 7 (Reference 10.34). As activities are planned and scheduled, additional waste management plans will be prepared, as needed, to address subsequent waste disposal, as required. Both pollution prevention and waste minimization practices will be incorporated into project planning and implementation. Low-level, hazardous, mixed, universal, TRU and non-hazardous solid waste streams may be generated during the deactivation project. The NMP-SFC-94-0531, F-Area Operations Low Level, TRU, RCRA Hazardous Waste, and Mixed Radioactive Waste Certification Plan (Reference 10.52) will be revised to incorporate the disposition of TRU waste by the Project Team. Alternatively, the

Project Team will develop and implement a new waste certification plan for TRU waste generation at Building 235-F.

Materials suspected of containing PCBs are to be managed according to the SRS PCB program as described in the Polychlorinated Biphenyl Manual (Reference 10.53). PCBs are likely present in the facility potentially in lighting ballast located in inactive areas/equipment within the building.

6.02.03 CERCLA

SRS compliance with CERCLA is managed through a Federal Facility Agreement between SRS, EPA, and SCDHEC. This agreement integrates the RCRA corrective action requirements with the CERCLA remedial requirements and prioritizes SRS actions based on risk. The PuFF Facility deactivation does not represent a CERCLA removal or remedial action and will not result in any permanent, non-reversible condition. As such, the deactivation does not fall under CERCLA. Rather, the deactivation will be performed to the requirements of SRNS Manual 1C, Procedures 301 and 302 (References 10.24 and 10.4, respectively) and DOE Order 430.1B.

Later decommissioning activities (not associated with deactivation) that result in a permanent, non-reversible condition and achieve the final end state of the facility will be evaluated for CERCLA impacts, prior to the initiation of the decommissioning activity.

6.03 Clean Air Act

During the PuFF Facility deactivation, the building ventilation system will continue to operate in its current mode. Because the deactivation disturbs Pu-238 in cells and glove boxes, there is a potential for increased radiological emissions. Therefore, using Appendix D of 40 CFR 61 (Reference 10.54), the ECA will assess the potential for additional radionuclide emissions (i.e., perform a Rad NESHAPS evaluation)[31] as a result of the deactivation. Using this information, the potential for exceeding the notification criteria in 40 CFR 61.07 and 40 CFR 61.09 will be evaluated.

The PuFF Facility deactivation should not result in the release of any Criteria Pollutants (SCDHEC Standard 2; e.g., particulate matter) or Air Toxics (SCDHEC Standard 8; e.g., benzene) based on previous calculations for Building 235-F. Any Asbestos Containing Materials (ACM) will be identified by the project and contained such that no air emissions are possible. Any fixative to hold material in place will be approved for use at SRS and within Building 235-F, and will not generate any air emissions. Additional new evaluations will be required, if this is found not to be the case.

[31] NESHAPS = National Emissions Standard for Hazardous Air Pollutants

The Project Team will provide information on details of ventilation system operation during the PuFF Facility deactivation for use in the Annual Air Emissions Inventory. Emission data will be provided for each calendar year in which the deactivation occurs.

The Building 235-F diesel generators are permitted by SCDHEC (Reference 10.55). These diesel generators are, however, outside the scope of PuFF Facility deactivation. D&D of the Building 235-F diesel generators will not be performed until some later date.

6.04 Clean Water Act/Safe Drinking Water Act

Wastewater effluents from Building 235-F are released to Outfall F-08. Blow down water from the 285-11F cooling tower is also discharged to Outfall F-08. The permit to discharge the above non-process cooling water to Outfall F-05 was set to expire on November 30, 2008. The discharges had to be eliminated by that time or rerouted to the environment via another pathway. SRS submitted a modified permit application in late 2007. Accordingly, a project was initiated which redirected that discharge to Outfall F-08. The revised permit has since been delayed by SCDHEC due to issues with the state of Georgia involving dredging of the port of Savannah. The subject permit delay has no impact on this project.

Domestic water and sanitary wastewater services have been provided to Building 235-F through permitted line connections. Sanitary waste, steam condensate generated from heating the building supply air, and domestic water used to cool instrument and process air compressors is discharged to the Central Sanitary Wastewater Treatment Facility via the 607-3F lift station. D&D of domestic water and wastewater services are outside the scope of PuFF Facility deactivation. As such, they will not be isolated and decommissioned until some later date.

7.0 Safety Standards and Requirements

7.01 Characterization and Hazards Identification

A Facility Condition Documentation Package (FCDP) per Manual 1C, Procedure 104 (Reference 10.56) has not yet been prepared for Building 235-F because the building remains under the custodianship of F-Area Operations and will remain under their custodianship for the duration of the deactivation project. The requirement to prepare an FCDP is applicable if and when the building is transferred to the Environmental Compliance & Area Completion Projects (EC&ACP). Although there is no FCDP for Building 235-F, there is extensive characterization data for the building. The data is adequate for the Project Team to identify hazards, to conduct hazards analysis, and to develop/implement controls in support of the deactivation project. With respect to characterization and hazard identification, the Project Team will rely on the following primary documentation:

- S-CLC-F-00534, "Master Engineering Calculation for 235-F Holdup Measurements" (Reference 10.6)
- T-CLC-F-00488, "Structural Integrity Program Inspection Report" (Reference 10.10)
- Asbestos Inspection Reports (Reference 10.57 and its Appendix C)
- Beryllium Inspection Report (References 10.57 and 10.58)
- Recent Radcon surveys (Reference 10.59)
- F-MFHA-F-00001, "Modification Fire Hazards Analysis for F-Area Complex, Building 235-F Deactivation Phase I" (Reference 10.80)
- F-FHA-F-00034, "Fire Hazards Analysis for Surveillance, Maintenance, and Remote Monitoring of Building 235-F including Support Buildings" (Reference 10.81)

7.02 Hazard Controls

The Project Team will implement an Integrated Safety Management System (ISMS) Program in accordance with SRNS Management Policies Manual 1-01, Policy 1.22, "Integrated Safety Management System" (Reference 10.60). Through implementation of the ISMS Program, the Project Team will systematically identify hazards for all deactivation activities, and systematically implement controls for any and all identified hazards. So as to systematically identify hazards and implement controls, the Project Team will implement programs/procedures that are contained within the SRNS Manuals listed in Section 11.0.

SRNS's ISMS Program has five core safety management functions, which provide the structure for integrating hazard identification and control into any work activity that could potentially affect the public, the workers, or the environment. The functions are applied as a continuous cycle with the degree of rigor commensurate with the type of work activity and hazards involved. Table 7.1 provides additional discussion regarding how the Project Team will perform the five core safety management functions and apply the key programs/procedures from the SRNS Manuals listed in Section 11.0.

Table 7.1 – Application of ISMS Core Safety Management Functions to the Deactivation Project

Function	Discussion
Define the Scope of Work	The scope of work for the PuFF Facility deactivation is defined by this Deactivation Project Plan. Within the plan, Section 3.0 and Appendix E define the deactivation "end points" and "end point activities" that lead to the desired deactivation end state (see Section 2.05 of this plan). Also, Attachment C contains the WBS dictionary for the deactivation. In support of this plan, the Project Team will develop sub-tier documents that also define the scope of work. As examples, per WBS # 01.29.24.01.09, the Project Team will develop scoping documents for various deactivation activities along with applicable designs. Scoping and design documents will be the basis for procedures (per SRNS Manual 2S) and work packages (per SRNS Manual 1Y or applicable Construction procedures) that further define the scope of work. Procedures and work packages will be the governing documentation for field activities.

Analyze Hazards	In support of the PuFF Facility deactivation, the Project Team will develop a "deactivation" safety basis (i.e., a "deactivation" BIO/TSR) for Building 235-F in accordance with SRNS Manual 11Q. In support of the deactivation safety basis, the project team will systematically identify "nuclear" hazards within Building 235-F, and analyze those hazards using the CHA process as defined by SCD-11 (Reference 10.61). Also in support of the deactivation safety basis, the Project Team will systematically identify fire hazards within Building 235-F and analyze those hazards in accordance with SRNS Manual 2Q, Procedure 2.14 (Reference 10.62). The end product of this process is a MFHA, which acts as a support document for the BIO/TSR. During the development of procedures and work packages (and as required by SRNS Manuals 1Y and 2S, and applicable Construction procedures), the Project Team will (1) walk down Building 235-F, (2) review applicable documentation (e.g., drawings), and (3) interview facility personnel. In this manner the Project Team will systematically identify "industrial" hazards associated with a planned deactivation activity. The identified hazards will be listed and documented in the procedures and work packages, primarily through the application of the Assisted Hazards Analysis (AHA) process as defined by SRNS Manual 8Q, Procedure 122 (Reference 10.63). The Project Team will implement the AHA process for all deactivation activities.
Develop and Implement Controls	The Project Team will develop and maintain a deactivation safety basis (i.e., deactivation BIO/TSR) in accordance with SRNS Manual 11Q. As required by SRNS Manual 11Q, the deactivation safety basis will establish controls for identified nuclear hazards. The Project Team and facility owner will implement the controls in accordance with SRNS Manual 11Q, Procedure 1.11 (Reference 10.64), and assess those controls (to verify adequate implementation) in accordance with SRNS Manual 12Q. Per SRNS Manual 11Q, Procedure 1.05 (Reference 10.41), F-Area Engineering will evaluate all planned deactivation activities using the USQ process to ensure compliance with the deactivation safety basis, and to ensure procedures and work packages implement applicable controls. The Project Team will develop procedures and work packages in accordance with SRNS Manuals 1Y and 2S, and applicable Construction procedures, which require reviews and approvals by SMEs and which ensure the procedures and work packages contain controls for identified hazards. The Project Team will develop controls primarily through the application of the AHA process as defined by SRNS Manual 8Q, Procedure 122 (Reference 10.63). The Project Team will review and evaluate hazards listed in the AHA and then identify the applicable controls. As needed, the Project Team will involve SMEs in the AHA process so as to fully understand and analyze hazards, and to develop the most effective controls. Note that during the development of controls, the Project Team will give priority to the elimination of a hazard vice the development/implementation of controls to mitigate the hazard. Also note that in accordance with SRNS Manual 5Q, the Project Team will prepare and implement radiological work permits for all work performed in radiologically-contaminated areas and/or involving radiological material. Finally, see paragraph at the end of this section (i.e., Section 7.02) for specific controls that the Project Team will implement and that protect the worker from exposure to radiological material. For all field activities, the Project Team will implement controls through adherence to the applicable procedures and work packages.

Performing Work within the Controls	For all field activities, the Project Team will perform work in accordance with applicable procedures and work packages. (Note that procedural adherence is a condition of employment and required by SRNS Manual 2S, Procedure 1.3 (Reference 10.65).) Prior to the work, the First Line Supervisor or delegate will conduct a pre-job briefing (in accordance with SRNS Manual 8Q, Procedure 122 (Reference 10.63)) to ensure workers understand the scope of work, know the pertinent hazards, and understand the required controls. In addition, as required by SRNS Manuals 2S and 4B, the First Line Supervisor will ensure all field activities are performed by qualified personnel. Finally, in accordance with SRNS's Human Performance Improvement program and training, the Project Team will use Human Performance Improvement tools (i.e., peer checking, self-checking, three-way communication, timeouts, and employing questioning attitudes) during the execution of all work.
Provide Feedback	As required by SRNS Manual 8Q, Procedure 122 (Reference 10.63), the Project Team will perform a "post-job review" of all completed work that involved a Full and Team AHA. Additionally, the Project Team will perform a "lessons-learned" evaluation at (1) the conclusion of Cells 6-9 decontamination and material removal and (2) the conclusion of Cells 3-5 decontamination and material removal. The intent of these lessons-learned evaluations is to review the preceding completed work and to identify both positive and negative elements of the completed work. The Project Team will continue to implement positive elements in subsequent deactivation activities, while the Project Team will implement alternate means and methods for the negative elements.

The Project Team will implement an Integrated Safeguards and Security Management (ISSM) system in accordance with SRNS Manual 7Q. The ISSM system addresses all topical areas of safeguards and security (e.g., personnel, physical, information, nuclear safeguards, cyber security, etc.) and related cross-cutting areas (e.g., export control, classification, foreign visits and assignments, and foreign travel). Through implementation of the ISSM system, the Project Team will ensure the adequate protection of DOE assets (e.g., classified matter, unclassified sensitive matter, and DOE property). With regard to Building 235-F, the Project Team's primary focus, when planning and executing deactivation activities, will be to ensure adequate protection of national security assets. Currently Building 235-F, located inside a General Area in F-Area, is an administrative Category IV Material Balance Area (Reference 10.66). Before the Project Team conducts deactivation activities that are intrusive to Cells 6-9, the Project Team will obtain a "termination of safeguards" (TOS) determination. Prior to the transfer of waste to Solid Waste, the Project Team will obtain the appropriate approvals for "discard" in accordance with SRNS Manual 14Q, Procedure 2.08 (Reference 10.67). Finally, in accordance with SRNS Manual 7Q, the Project Team will remove and/or eliminate (via destruction or downgrade) unclassified sensitive information located in or associated with Building 235-F.

The Project Team will revise the existing F-Area Fire Protection Plan (FPP) to address the planned deactivation, where the revised FPP is the implementing document for programs and controls identified in the MFHA. As such, the FPP establishes the fire protection features, administrative controls, surveillance requirements, and fire protection responsibilities and requirements that the Project Team will implement for the PuFF Facility deactivation. Further, the FPP will provide for adequate levels of fire protection and personnel safety for the various levels of occupancy and for the planned deactivation activities. In this manner,

the FPP provides for the safety of workers and the Public, as well as for the safe completion of the project. The FPP will accomplish the following primary objectives:

- Provides an adequate degree of life safety to personnel,
- Minimizes the potential for occurrence of fire, and
- Provides a defense-in-depth approach for protecting the worker and the Public from fire in Building 235-F while the PuFF Facility is undergoing deactivation.

Exposure to radiological material is a primary and significant hazard associated with the PuFF Facility deactivation. To mitigate and prevent exposure during activities that are intrusive to Cells 1-9 and their attached glove boxes, the Project Team will implement the following primary controls:

- Ensure the Building 235-F ventilation is in operation, and continuously verify that the cells and glove boxes are under negative pressure. (See WBS No.01.29.24.01.07.01, which includes the installation of local, low-differential pressure alarms.)
- As a minimum, make use of secondary containments during the bag out of waste, removal of manipulators, and the initial installation of gloves.
- Wear PPE as required by the applicable work package, radiological work permit and AHA. In general, use breathing air. (See WBS No. 01.29.24.01.11.06, which includes upgrades to the Building 235-F breathing air distribution.)
- Ensure Radiological Protection inspectors are present and performing required radiological monitoring.
- As required by the deactivation BIO/TSR, develop and implement a "Puncture/Laceration Wound Hazard Management" (P/L WHM) program. (See WBS No.01.29.24.01.07.01, which includes the development and implementation of the P/L WHM program.)
- To the degree practical, use long-handled/extension tools to conduct decontamination, material removal, and immobilization within Cells 1-9.
- In accordance with SRNS Manual 8Q, complete a Final Acceptance Inspection on long-handled/extension tools prior to their use.
- Build a mockup of the cells and train workers on the use of tool within the mockup. Additionally, using the mockup, train workers on the operation/maintenance of glove and bag out ports, and the removal/installation of manipulators. (See WBS No.01.29.24.01.07.04, which includes the fabrication of a mockup.)
- Use only hand and non-hydraulic power tools to segment components within the cells and glove boxes. (Prevent hot work and the introduction of flammable materials.)

8.0 Waste Management

8.01 Waste Minimization and Pollution Prevention

F-Area Operations has a waste minimization program, which reduces the amount of waste generated and/or is shipped for disposal. The objective of this waste minimization program is to provide an organized, comprehensive, and continual effort to systematically reduce waste generation. Source reduction, recycling and reuse are among the practices used to achieve program objectives. The program addresses radioactive waste, hazardous waste, mixed waste, and non-hazardous solid waste streams. To meet the objectives, the program utilizes training, procedures, oversight, goal setting, planning, and comprehensive record keeping. The Project Team will work under this existing program during the PuFF Facility deactivation.

F-Area Operations' waste minimization program meets the requirements outlined in the SRNS Manual 3Q, Procedure 6.11, "Pollution Prevention Program", (Reference 10.68), and in the F-Area Operations Low Level, TRU, RCRA Hazardous Waste, and Mixed Radioactive Waste Certification Plan, (Reference 10.52). The current F-Area Waste Certification Plan addresses and covers only that very limited amount of TRU Waste encountered/generated on a non-routine basis. As such, it must be revised to add TRU Waste encountered on a routine basis, as will be the case during deactivation of the PuFF Facility. No TRU waste, beyond incidental and very limited, non-routine quantities, shall be allowed to be generated by project deactivation activities until the F-Area Waste Certification Plan has been approved, issued, and validated.

The Project Team will implement a hierarchical approach to waste reduction and will apply the approach to all waste types. The first priority in waste reduction is to eliminate or minimize the generation of waste through source reduction. Those potential waste materials that cannot be eliminated or minimized will be recycled when possible.

In accordance with the F-Area Waste Certification Plan, the Project Team will ensure that personnel performing waste management activities are properly trained to a level commensurate with the scope, complexity, and nature of their assigned tasks. Project personnel will be trained according to ALFCTPD1.PDES, Analytical Labs and F-Area Complex Training Program Description (Reference 10.69).

The Project Team will use F-Area's Technical Reference Procedure 221-F-55025 (Reference 10.70) to identify and implement pollution prevention techniques into waste generation activities. This procedure requires that the person responsible for an upcoming task incorporate waste certification and characterization requirements into the preplanning for that task. The ECA has the responsibility, with GCO support, to identify potential pollution prevention techniques for

incorporation in the work documents being developed for the planned waste-generating task.

The use of "best practices" has proven to be effective in minimizing waste and reducing costs. Some of those practices include, but are not limited to the following and will be incorporated to the extent practicable into the PuFF Facility deactivation:

- Including pollution prevention and waste minimization in project plans and subcontracts
- Communicating and emphasizing pollution prevention with the Project Team
- Locating equipment (e.g., motors, sampling ports, etc.) requiring frequent access outside of CAs where possible
- Minimizing entry into CAs by efficient work scheduling
- Removing packaging materials prior to taking the contents into a CA
- Practicing good housekeeping (poor housekeeping generates waste)
- Utilizing re-useable supplies when possible

8.02 Anticipated Wastes

Except for some wastewater from drained shield windows, only solid waste is anticipated to be generated during the deactivation project. The waste generated will be transferred to Solid Waste for temporary storage (e.g., E-Area TRU pad for staging TRU waste while awaiting final packaging and shipment off-Site) or disposal (e.g., E-Area slit trenches for low level waste (LLW)). Once the waste is transferred to Solid Waste, its continued management and handling is no longer within the scope of the deactivation project. To the extent practical, the wastes generated during the deactivation project will be appropriately characterized prior to generation. Waste volume forecasts are provided in Tables 8.1 and 8.2.

The current F-Area Waste Certification Plan (Reference 10.52) addresses and covers only that very limited amount of TRU Waste encountered/generated on a non-routine basis. As such, it must be revised to add TRU Waste encountered on a routine basis, as will be the case during deactivation of the PuFF Facility. (Alternatively, the Project Team will develop and implement a new waste certification plan for TRU waste generation at Building 235-F.) No TRU waste, beyond incidental and very limited, non-routine quantities, shall be allowed to be generated by project deactivation activities until the F-Area Waste Certification Plan (or new waste certification plan) has been approved, issued, and validated.

In accordance with SRNS Manual 1S, Chapter 7 (Reference 10.34), the Project Team plans to process a deviation request through Solid Waste for approval to increase the SRNS Manual 1S, Chapter 7 (Reference 10.34) limit from 80 PEC (i.e., approximately 4.3 grams of Pu-238) for a 55 gallon TRU drum and 130 PEC (i.e., approximately 7.0 grams of Pu-238) for a Standard Waste Box (SWB) to 500 PEC (i.e., approximately 30 gram of Pu-238) for each. Approval of the

deviation request would result in approximately a seven (7) fold reduction in handling and shipping costs for the TRU waste, as well as supporting F-Area Operations' overall waste minimization program. The baseline scope, schedule and cost for the deactivation project assume the deviation is approved.

Table 8.1 - Building 235-F Waste Volume Forecasts for Cells 3–9 (Including Glove Boxes)

Waste Type	Waste Description	Est. Waste Volume (m^3)
LLW	Radiological materials[32], PPE, wipes, smoke tubes, hoses, respirator cartridges, sealant cartridges, plastic sheeting, tape, absorbent, & leak collection rigs	21.75 (8 B-25 Boxes)
TRU (debris)	Includes manipulator arms/removed equipment. Also, includes corrosion products (e.g., aluminum oxide from manipulators), sweepings, HEPA filters, vacuums, hosing, baggies, batteries, brushes, scoops, absorbent w/oil, wipes, wipes w/oil, gel sections, rollers, hand tools, components/equipment (e.g., graphite molds, alpha monitors, metal/plastic containers, metal trays, scales, lamp assemblies (w/mercury vapor lamps), hoists, rope, etc.) hand tools, instrumentation, wiring, and plastic.	13.9 (1 SWB) (58 TRU drums)
Universal	Light bulbs	0.21

Table 8.2 - Building 235-F Waste Volume Forecasts for Cells 1 & 2 (Including Glove Boxes)

Waste Type	Waste Description	Est. Waste Volume (m^3)
LLW	Radiological materials[33], PPE, wipes, smoke tubes, hoses, respirator cartridges, sealant cartridges, plastic sheeting, tape, absorbent, & leak collection rig	40.8[34] (15 B-25 boxes)
TRU (debris)	Includes corrosion products (e.g., aluminum oxide from manipulators), sweepings, HEPA filters, vacuums, hosing, baggies, batteries, brushes, scoops, absorbent w/oil, wipes, wipes w/oil, gel sections, rollers, hand tools, components/equipment (e.g., graphite molds, alpha monitors, metal/plastic containers, metal trays, scales, lamp assemblies (w/mercury vapor lamps), hoists, rope, etc.) hand tools, instrumentation, wiring, and plastic.	53.4[35] (10 SWBs) (163 TRU drums)
Universal	Light bulbs	1

[32] "Radiological materials" includes those items that support the implementation of Manual 5Q controls, e.g., swipes, step-off pads, ropes, labels, placards, etc.

[33] "Radiological materials" includes those items that support the implementation of SRNS Manual 5Q controls, e.g., swipes, step-off pads, ropes, labels, placards, etc.

[34] A large quantity of LLW is expected to be generated during deactivation work in Cells 1&2 due to the high concentration of Pu-238 within these cells and expected lengthy duration for decon and material removal.

[35] The estimate is based on the SRNS Manual 1S limit of 80 PEC, which equals 4.3grams of Pu-238 per 55 gallon TRU drum (747 grams of Pu-238 ÷ 4.3g per drum = 174 drums). Total of 174 drums x 7.35 ft^3 volume per drum = 1200 ft^3.

8.02.01 Asbestos

Numerous initial inspections of potential ACMs were performed in the Building 235-F Complex per SOP-FDD-079 (Reference 10.71) and documented in Reference 10.57 and its Appendix C. These inspections identified 34,000 ft^2 of transite in the Building 235-F Complex, but little to none in the PuFF Facility. Additional inspection and sampling, per SOP-FDD-079, will be performed before and/or during the deactivation project for suspect material in the PuFF Facility. If needed, removal and disposition of asbestos will be accomplished in accordance with the SRNS Manuals 3Q and 4Q.

8.02.02 Beryllium

A Beryllium Legacy Area has been identified in Building 235-F (References 10.57 and 10.58) as a result of historical storage and handling of beryllium components. This legacy area potentially involves Rooms 113, 116, 109, 110, 111, 111A, 101, 102, and 105. While no deactivation activities will be performed within these rooms, there will be some incidental use associated with waste handling (Reference 10.72). The legacy area will be characterized, as necessary, to determine the extent of any beryllium surface contamination. Further actions will be developed dependent on the results of the characterization. The requirements of the SRNS Manual 4Q, Procedure 209 (Reference 10.73) will be followed.

8.02.03 Lead

Some lead may be encountered during the deactivation project (Reference 10.57). If encountered, then the Project Team will remove and manage the lead in accordance with SRNS Manual 4Q, Procedure 208 (Reference 10.74) and SRNS Manual 3Q, Procedure ECM 6.20 (Reference 10.75).

8.03 Control and Disposition of Special Nuclear Material

Holdup remaining in Building 235-F is associated with the residual radiological contamination in the PuFF Facility, PEF, ABL and OML. During the deactivation project, the residual radiological contamination in the PuFF Facility will be removed, to the maximum extent practicable, from Building 235-F.

Table 2-3, Sheet 22 of 67, of S-CLC-F-00493 (Reference 10.76) and Table 3-5 of the S&M BIO (Reference 10.11) summarize the legacy holdup of Special Nuclear Material (SNM) currently in Building 235-F as determined by assays. The nominal value of holdup (Pu-238) associated with the PuFF Facility is approximately 852.5 grams. MAR is assumed to be 1.75 times assay value + uncertainty. The subtotal value of 1,522 grams of Pu-238 for all of the PuFF

Facility, shown in Table 3-5 of Reference 10.11, reflects a conservative MAR value that is 75% greater than the assay value plus uncertainty.

Additional in-situ assaying of the cells and glove boxes will be performed during deactivation to further quantify legacy holdup. If necessary, results will be incorporated into the next revision of this document.

Waste that is removed from Building 235-F during the PuFF Facility deactivation will be assayed for SNM content and the result subtracted from the legacy holdup to maintain real time SNM inventory as the deactivation progresses. In the context the term "waste" is used here, "waste" includes all materials or items removed from the PuFF Facility. With respect to waste assay, several work package (see WBS Nos. 01.29.24.01.11.01, 01.29.24.01.15.01, and 01.29.24.01.16.02) are geared to the identification and implementation of proper assay techniques.

Complete termination of safeguards will be accomplished prior to commencement of the PuFF Facility deactivation. Termination of safeguards will be based on meeting the conditions of DOE Order 474.2, Administrative Change 2 (Reference 10.77) as documented in a Termination of Safeguards (TOS) Letter (yet to be processed) and Reference 10.66. Because the holdup is expected to meet the conditions of DOE Order 474.2, Administrative Change 2; the TOS letter will approved by local DOE (i.e., DOE-SR). Note that the remaining material in the facility is embedded in and affixed to system components. Therefore, it is "unrecoverable holdup" (i.e., it is beyond economical and technical recovery).

To exempt accountable quantities of SNM from the requirements of the current DOE order for material control & accountability (MC&A), (i.e., terminate safeguards), the material is required to meet the following primary conditions:

- The material must be attractiveness level E.
- The material must be determined by DOE to be of no programmatic value.
- The material is transferred to the control of a waste management organization where the material is accounted for and managed as waste.

9.0 Supporting Documents

9.1 DOE O 430.1B, "Real Property Asset Management."
9.2 DOE O 413.3B, "Program and Project Management for the Acquisition of Capital Assets."
9.3 DOE/EM 318, "Facility Deactivation Guide."
9.4 DOE G 430.1-3, "Deactivation Implementation Guide."
9.5 "Earned Value Management (EVM) System Description," SRNS-PC-2009-0001, Revision 5, dated August 31, 2011.
9.6 Manual 1-01, Management Policies, MP 5.24, "Facility Disposition."
9.7 10 CFR 835, "Occupational Radiation Protection."