



**Department of Energy**  
Savannah River Operations Office  
P.O. Box A  
Aiken, South Carolina 29802

**FEB 28 2013**

The Honorable Peter S. Winokur  
Chairman  
Defense Nuclear Facilities Safety Board  
625 Indiana Avenue, NW, Suite 700  
Washington, DC 20004

Dear Mr. Chairman:

SUBJECT: Transmittal of Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 2012-1 Implementation Plan (IP) Deliverable 3-2.

This letter transmits a deliverable consistent with Commitment 3-2 of the Department of Energy's IP for DNFSB 2012-1, Savannah River Site, Building 235-F Safety. The deliverable is a documented review of the existing protective action plans and procedures to ensure that all F-Area tenants are protected from the hazards associated with a radiological release from Building 235-F.

We will continue to work with your staff to effectively respond to the concerns raised in the recommendation, and complete the IP.

If you have any questions please contact me, or have your staff contact Patrick McGuire, Assistant Manager for the Nuclear Materials Stabilization Project at (803) 208-3927.

Sincerely,

A handwritten signature in black ink that reads "David C. Moody".

David C. Moody  
Manager

NMPD:VW:rsh

NMPD-13-0019

Enclosure:  
Letter, Hunt to McGuire, 02/11/13

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**FEB 28 2013**

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File Code:

February 11, 2013

SRNS-N0000-2013-00008  
RSM Track No. 10667

Mr. Patrick W. McGuire, Assistant Manager  
Nuclear Material Stabilization Project  
Savannah River Operation Office  
P. O. Box A  
Aiken, SC 29802

Dear Mr. McGuire:

**DNFSB 2012-1 ACTION 3-2, "PERFORM REVIEW OF EXISTING PROTECTIVE ACTION PLANS AND PROCEDURES TO ENSURE PERSONNEL ARE PROTECTED FROM THE HAZARDS ASSOCIATED WITH A RADIOLOGICAL RELEASE FROM BUILDING 235-F AND IMPLEMENT ADDITIONAL CONTROLS AS REQUIRED"**

The purpose of this letter is to provide the response to the DOE-SR deliverable listed in Action 3-2 of the approved DOE Implementation Plan for DNFSB Recommendation 2012-1.

Attached is the Assessment of Protective Action Plans and Procedures called for in the referenced Implementation Plan. The assessment recognizes the unique level of hazard posed by the 235-F Facility, concludes that our protective action plans and procedures are adequate to protect employees, and identifies planned improvements including additional controls to be implemented and their planned completion dates.

Please feel free to contact me or Dewitt Beeler, 2-4372, of my staff if you need additional information.

Sincerely,



Paul D. Hunt, Senior Vice President  
Environmental Management Operations

db/cc

Att.

c: P. W. McGuire, DOE-SR, 703-H  
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Savannah River  
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January 31, 2013

# Assessment of Protective Action Plans and Procedures

Defense Nuclear Facilities Safety Board Recommendation  
2012-1, Action 3-2

Approved by:

Melanie M. Lepard, Manager, Emergency Management

2/5/2013

Date

Donald R. Ludwick, Manager, Emergency Services

2/5/13

Date

Alice C. Doswell, Vice President, ESSH

2/5/13

Date

Paul D. Hunt, Vice President, EM Operations

2/5/13

Date

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## **Introduction**

### **Purpose and Scope of Assessment**

Action 3-2 of the Implementation Plan for Defense Nuclear Facilities Safety Board Recommendation 2012-1, *Savannah River Site Building 235-F Safety*, commits SRS to perform a review of existing protective action plans and procedures to ensure that personnel are protected from the hazards associated with a radiological release from Building 235-F and implement additional controls as required.

The circumstances surrounding Building 235-F are unique, particularly with regard to the type and level of hazard as well as the presence of construction areas adjacent to this facility, which pose a challenge with respect to protection of employees. Other facilities in F-Area present less of a hazard, though the type of hazard (radiological) is the same.

The Building 235-F Basis for Interim Operations (Reference 1) postulates a seismic event, compounded by a full-facility fire involving the entire Material At Risk (MAR). The consequences of this event exceed the 100-rem threshold from Reference 2 for determining the need for Safety Significant controls as well as the 1-rem Protective Action Criteria (PAC) from Reference 3. It is expected, however, that the actual consequences of a release would be significantly lower due to several mitigating factors such as distance to the receptor location, release duration, and fire propagation time.

This assessment encompasses all F-Area facilities, including the F-Area Complex, F-Area Tank Farm (FTF), Mixed Oxide Fuel Fabrication Facility (MOX), and the Waste Solidification Building (WSB).

This report documents the method, results, and conclusions of the assessment performed to fulfill this commitment.

### **Protective Action Definitions**

Protective Action options at the Savannah River Site (SRS) are defined in Reference 4.

#### **Remain Indoors**

Remain Indoors is defined as:

*A protective action taken for events involving releases of radiological or toxic chemicals when people are in imminent danger, since even temporary buildings, trailers or frame buildings provide a level of protection against inhalation/skin exposures if doors and windows are closed and systems that draw in outside air are shut down, if such action does not constitute a greater risk to health and safety.*

Remain Indoors is an action taken by employees to use a physical barrier, usually a building, to separate or shield themselves from a hazardous material release to minimize contact with either the material or its hazardous effect. Remain Indoors is often considered to be most effective for emergencies in which employees may actually

or potentially be exposed to a hazardous material release **and** immediate evacuation is either not feasible or has unacceptable risks.

The reduction in exposure, when compared to the potential exposure from remaining outside, can be substantial. Remain Indoors minimizes health effects by minimizing the amount of airborne hazardous material entering into a building, lowering the individual exposure.

Employee actions when a protective action of Remain Indoors is issued include:

- Go immediately to the nearest indoor location (even temporary buildings, trailers or frame buildings)
- Close doors, windows, and outside air intakes
- Shut down ventilation systems unless shutting down ventilation systems will adversely impact health and safety.

During this review, it was noted that the definition of Remain Indoors lacks clarity with respect to the types of buildings that are suitable for use as Remain Indoors location, specifically that the definition does not exclude those buildings that are either under construction or that are incapable of being adequately sealed to prevent outside air infiltration. See Planned Improvement (PI) #1.

### **Evacuate**

The protective action of Evacuate is defined as:

*The movement of site populations, in a facility or area, to a rally point or assembly area for accountability and, if warranted, relocation purposes.*

Each facility/area has designated at least two Rally Points. When the protective action of Evacuate is issued, employees are told via Public Address (PA) announcement or other means which Rally Point to use and any areas to avoid.

Employee actions when a protective action of Evacuate is issued are to go immediately to their assigned locations at the designated rally point or assembly area and to remain there until given other instructions.

## **Protective Actions**

### **Determination of Initial Protective Actions**

Reference 5 describes the process Department of Energy (DOE) sites should use to determine which initial protective actions are appropriate for the events that may occur. Key concepts from this guidance include:

- Risk to individuals should be limited by taking protective actions that produce a positive net benefit to the individuals involved i.e., the risk to the individual from taking the protective action is lower than the risk from exposure or dose that is thereby avoided.

- Evacuation can generally be considered 100% effective for reducing hazardous material exposures and resulting health impacts, but only if it can be accomplished before the hazard is actually present in the location being evacuated and only if the people can exit the affected area without encountering the hazard while they are in transit.
- Remain Indoors reduces exposure to airborne hazardous materials by having people go (or stay) indoors while the plume is passing, thereby taking advantage of the radiation shielding provided by the structure and/or the lower concentration of airborne contaminants inside the structure. This is generally considered the only practical protective action, when there is not sufficient time to evacuate a population before the plume arrives at their location.

Reference 5 includes additional, specific information used to decide between Evacuate and Remain Indoors as an initial protective action. It reads, in summary:

#### **Evacuate**

The decision to evacuate usually hinges not on its effectiveness, but on whether it can be accomplished before plume arrival and the health impacts that might occur if the plume arrives during the evacuation when people are completely unprotected.

Except for emergencies that affect very small areas and distances (i.e., a few hundreds of meters), evacuation nearly always requires some type of transportation resources. Any decision to evacuate must take into account whether the transportation resources:

- Will be available where needed in the required time,
- Can accommodate the number of people expected at each location, including persons with special needs, and
- Can move them out of the affected area in time to avoid exposure to the plume.

Moving people from an area where they may be harmed to a safe haven, without subjecting them to exposure or additional hazards along the way is not a simple matter, particularly when it should be done on a time scale of minutes to a few hours. *Ad hoc* evacuation conducted without detailed planning and designated transportation resources, routes, destinations, and accountability procedures can entail greater risks to the evacuees.

Evacuation carries some degree of additional health risk to the evacuees, which may be much higher when the hazardous material emergency is concurrent with a natural disaster. The risk to emergency workers facilitating the evacuation must also be considered.

#### **Remain Indoors**

The effectiveness of remaining indoors can vary greatly depending on the nature of the hazardous material, weather conditions, type of structure, duration of the release, and the ability of the people in that building to take additional measures to reduce infiltration of outside air into the structure.



In its most basic form, Remain Indoors requires little special planning or preparation. The affected population needs only to be notified that they should stay inside or go into nearby structures. Even without special preparations, ordinary structures such as office buildings can be very effective in reducing exposures but only for releases of short duration.

For substances that are hazardous through inhalation, the maximum reduction of dose/exposure will normally be achieved if people move out of the structure promptly after passage of the plume. People who remain inside a building, where the air is contaminated by infiltration from the passing plume, will ultimately receive about the same cumulative exposure as an unprotected person exposed to the same plume.

### Application of Concepts to F-Area Facilities

In Emergency Planning Hazards Assessments (EPHAs), hazardous material releases are modeled using a wind speed of 1.7 meters per second (Reference 6). The table below identifies the approximate distances from 235-F to key locations within F-Area, including the approximate time from the start of a release until the leading edge of a plume arrives at that location.

Location	Approximate distance from 235-F (meters)	Approximate Time until Plume Arrival (minutes)
MOX	500	5
WSB	250	2.5
772-F	425	4
717-F	485	4.75
241-1F (FTF Control Room)	780	7.5
241-18F (FTF Control Room)	900	9

Applying the concepts discussed previously, evacuation of F-Area facilities is not feasible in the time available before personnel risk exposure from a hazardous material release. Thus, Remain Indoors is the only viable choice for initial protective action for releases from 235-F. Once the plume has passed over the facilities, personnel will be relocated from the hazard in a controlled manner. This will ensure the continued safety of the employees, the primary concern, and minimize the spread of radioactive contamination.

### Protective Action Process

#### Initial Protective Actions

Upon notification of a radiological release in progress, a Remain Indoors protective action is issued for an area encompassing at least a two-mile radius around the release point. Based on the emergency classification, this area may be expanded to include all points within a 67 ½-degree arc centered on the wind direction and extending downwind to the site boundary.

Protective action instructions may be issued by either the Area/Facility Emergency Coordinator (AEC/FEC) or the Emergency Duty Officer (EDO) in the Savannah River Site Operations Center (SRSOC). For a radiological release from 235-F, the initial protective action instructions will likely be issued by the F-Area AEC.

### **Longer-Term Protective Actions**

Relocation of personnel will be initiated and coordinated by the site-level Emergency Response Organization (ERO) after activation. Guidance on these activities is contained in site-level response procedures, References 7, 8, and 9. Though the specific actions taken are dependent on the event in progress, the general process is:

1. Reception centers upwind of the event are activated by notifying the host AEC/FEC and requesting that they prepare to receive personnel being relocated. If needed, additional personnel can be provided to assist with operation of the decontamination and monitoring facility.
2. Relocation route(s) that minimize exposure to hazardous material releases are determined and provided to the incident/affected AEC/FEC. Workers being relocated are notified of the destination and the planned route. The site's security contractor is requested to provide escorts from rally point(s) to designated reception center(s).
3. Additional transportation vehicles such as buses or vans are requested, if needed.
4. Once personnel have been relocated, accountability is reestablished. Personnel are monitored for contamination and decontaminated if necessary.

Once monitoring and decontamination is complete, personnel may be released from the site.

## **Assessment**

### **Assessment of Existing Plans and Procedures**

#### **Facility-Level**

An assessment was conducted in all F-Area Facilities to determine whether the current plans and procedures provide sufficient guidance on the selection and implementation of protective actions.

The Lines-of-Inquiry (LOIs) used and the information obtained from the F-Area facilities are provided below.

- LOI #1: Do the procedures identify the protective action to be implemented for radioactive releases from 235-F?
- a) What actions are specified?
  - b) Is allowance made for supervisory personnel to implement different protective actions based on event-specific information?

c) What guidance is provided to supervisory personnel to determine protective actions?

**Response:** Procedures in the operating facilities in F-Area identify Remain Indoors as the initial protective action that should be issued by the AEC for radiological releases from 235-F. Following an earthquake, the following announcement will be made to F-Area<sup>1</sup>:

**“Attention all F-Area personnel! Attention all F-Area personnel!**

**SRS has experienced a severe earthquake. All personnel remain in a safe location. Get under sturdy furniture or in a doorway frame. Stay clear of overhead hazards, glass doors and windows, fallen power lines, broken steam lines, and broken glass. If you are not in a safe location, attempt to get to one.**

**All F-Area Emergency Response Personnel report to your designated Emergency Response Facility, if safe to do so, and report any observed damage.**

**All other personnel wait for further instructions.”**

This announcement contains guidance that is no longer appropriate, specifically the statement that employees should stand in a doorway. (See PI #2)

The AEC’s procedure allows the AEC to use his/her judgment, in combination with event-specific information, to issue a different protective action. Procedures provide general guidance relating the type of event to a recommended protective action.

The MOX Emergency Response Manual (Reference 10) identifies Remain Indoors as the initial protective action, which should be issued by the F-Area AEC. The MOX Emergency Response Manual does not provide any latitude for supervisory personnel to implement a protective action other than what is directed by the F-Area AEC.

WSB is a construction site within F-Area and implements the protective actions issued by the F-Area AEC without deviation.

Reference 10 also includes a list of MOX Services buildings that are available for personnel to use when directed to Remain Indoors, including the available square footage in each building. Using that information, there is greater than 400,000 square feet of available space.

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<sup>1</sup> Reference 12, Attachment 8.26 and Reference 13, Attachment 8.11

Reference 11 provides general guidance on the amount of floor space needed. Applying this general guidance conservatively, the amount of floor space is reduced by 50%. Employees that are not wheelchair-bound should be allowed a minimum of 20 square feet. With these factors applied, MOX has sufficient space for approximately 10,000 employees, which is enough space for the combined population of MOX and WSB.

LOI #2: Review notification requirements for 235-F events.

- a) What notifications are made?
- b) Are points of contact identified for each facility?
- c) Do those points of contact understand their role in implementing protective actions for their facility?

Response: Notifications are made to F-Area facilities in by the F-Area AEC. The AEC will sound the Safety Alarm System (SAS) warble and make a PA announcement notifying personnel of the emergency and directing implementation of protective actions. Additionally, the AEC notifies the EDO that protective actions have been implemented in F-Area.

Points-of-contact have been identified for each facility. The AEC has this information and has the ability to make contact with supervisory personnel in each F-Area facility.

Facility supervisory and management personnel have been briefed on their role in implementing protective actions, to include the need to communicate any issues or concerns to the AEC.

#### **Site-Level**

Site procedures were assessed to determine if appropriate guidance is provided to site-level ERO members to ensure that personnel are protected longer-term. A specific focus area of the assessment was the need and ability to relocate personnel away from a hazard.

Protective actions will initially be implemented by facility-level responders, specifically the AEC in F-Area and the Emergency Duty Officer in the SRS Operations Center (SRSOC).

Site-level ERO members assume responsibility for protective actions after the Emergency Operations Center (EOC) is activated, normally within approximately an hour after emergency declaration. However, ERO members arrive in the EOC prior to activation and immediately start reviewing the protective actions in place to determine the need for any changes, which may include relocation of personnel.

Reference 7 is the site's protective action procedure and contains the following procedural steps:

Perform the following if personnel are evacuated out of an incident/affected area and need to be relocated (for staging, monitoring and decontamination) to other areas onsite:

- Activate appropriate “upwind” reception centers onsite listed on Attachment 8.3, *Onsite Reception Centers* by notifying the host AEC/FEC,
- Determine reception center relocation route(s) which minimize exposure to hazardous materials releases, and advise the incident/affected AEC/FEC of the routes and reception center location(s) so that announcements can be made to the evacuating workers, and
- If additional transportation vehicles are needed (i.e., buses, vans, etc.), make requests, and provide information and direction as follows:
  - Rally point location,
  - Appropriate routes to take, and
  - Reception center locations.

During normal duty hours, and prior to EOC activation, contact Site Infrastructure Transportation Dispatcher.

During off-shift hours, or after EOC activation, contact the on-call Site Logistics Coordinator.

As the overall Command and Control function after the EOC is activated, the Emergency Director has responsibility for protective actions on site, with input from other ERO members. The Emergency Director uses a procedure checklist from Reference 8, which contains the following guidance:

If an area relocation (including the incident area) is warranted, be prepared to support the action by performing the following:

- a. Designate an appropriate onsite reception center (SRS reception center list is in Manual 6Q15.1, Procedure 103, *Protective Actions*) and relocation routes to be followed, in consultation with the Assessment and Planning Coordinator and the Site Security Commander.
- b. Direct the Site Security Commander to provide escorts from rally point(s) to designated reception center(s).
- c. Direct the Site Logistics Coordinator to arrange for transportation (buses) or other resources that are requested.
- d. Direct the Assessment and Planning Coordinator to determine if personnel are needed to provide monitoring/decontamination at reception center.
- e. Notify EOC of decisions regarding response actions to be implemented.

## **Employee Level of Knowledge**

The effectiveness of protective actions is influenced by the ability of personnel to implement the protective actions, which is in turn, influenced by worker knowledge of the meaning and required actions. All employees receive initial training on how to implement protective actions as part of General Employee Training (GET) and annual refresher training as part of Consolidated Annual Training (CAT). However, during the conduct of this assessment, it was noted that the general employee's level of knowledge regarding protective actions, and the specific actions to be taken, had not been assessed.

To gain additional insight on this issue, field interviews were conducted with personnel at WSB and MOX. Interview questions covered a range of general knowledge topics such as employee actions when hearing the Safety Alarm System (SAS), general meaning of Remain Indoors, and the location of buildings that are appropriate for use as a Remain Indoors location.

Generally, employees demonstrated they were knowledgeable of their required actions upon hearing the SAS and the general meaning of the term Remain Indoors. However, employees did not demonstrate an acceptable level of knowledge about locations suitable for use as a Remain Indoors location or the actions they should take upon arriving at a Remain Indoors location. (See PI #3 and #5)

## **Assessment of Remain Indoors Locations**

Survivability and level of protection provided by buildings on site is heavily dependent on the specific construction characteristics of the building and the level of severity of the event. It is not feasible to determine the amount of damage a specific building may sustain, or the decrease in protection provided, when the severity of the event is unknown. It is expected that buildings in F-Area will sustain damage during a seismic event, but the level of damage for each building cannot be determined.

Buildings across the site can be categorized into one of several basic designs.

### Trailers / Mobile Office Buildings:

There are numerous trailers or mobile office buildings throughout F-Area. Construction varies widely depending on the age and manufacturer of the structure.

### Office Buildings:

These structures are the most prevalent office building on site and appear in most of the areas. The building is a single-story metal-framed, brick veneer over Concrete Masonry Units (CMU) exterior walls, with a metal deck roof over open web bar joists, office building.

### Stucco Clad Office Buildings

Several office buildings on site appear similar to the brick veneer office building described above, but rely on tension braces to provide stability to the structure. The exterior walls of these structures consists of (from inside to out) gypsum board, metal stud, rigid insulation, and stucco finish.

### Stucco Clad CMU Wall Office Structures

These structures provide slightly more resistance than the general stucco clad buildings, but do not provide as much protection as the brick veneer CMU wall construction.

### Pre-engineered Metal Buildings

Pre-engineered metal buildings are of steel frame construction with frames in one direction and cross bracing in the other direction. The sides and roofs are clad with metal decking screwed to channel shaped girts or purlins.

### Hardened Structures

These structures are constructed of reinforced concrete.

During this assessment, it was noted that the MOX Emergency Response Manual states that Building 226-F, the main MOX processing building, "does not qualify as a Remain-Indoors location due to the lack of ability to seal the area and eliminate incoming air, which could contain contaminants."

Additionally, trailers or mobile office buildings may be used as a Remain Indoors location during less severe events, but the level of protection provided by this type of structure may be less than that provided by permanent structures, depending on the structural integrity of the specific building following the initiating event. Even for relatively tight buildings, the benefit of remaining indoors (i.e., reduction in the air concentration) is only about 50% after approximately two hours. For a radiological release expected to last for a couple of hours or more, early evacuation of people in the plume path should be considered because the integrated exposure (and committed dose) may be lower for a short duration unprotected transit of the plume than for breathing the reduced, but steadily increasing concentration inside a building for several hours.<sup>2</sup> Consideration of such factors is built in the Site's emergency management process for responding to such events.

Based on a qualitative assessment, SRS believes that remaining indoors until a plume passes reduces the exposure potential to workers.

While remaining in a building that is intact enough to allow safe occupancy will provide some protection, opportunities may exist to improve the level of protection provided. (See PI #4)

## Planned Improvements

During the assessment, Planned Improvements (PIs) were identified, which are detailed below.

**PI #1:** The definition of Remain Indoors in SCD-7, Section 7, *Protective Actions*, and Appendix II, *Definitions*, does not clearly state that buildings under construction or that are open to outside air with no way of being sealed should not be used as a Remain Indoors location.

**Action #1:** Revise affected sections of SCD-7 to clarify which buildings are acceptable for use as Remain Indoors locations.

**Deliverable:** Approved revisions to SCD-7 Section 7 and Appendix II

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<sup>2</sup> Reference 5 §7.3.4

- Due Date:** April 30, 2013
- Action #2:** Perform extent of condition review of site-level procedures to determine if other procedures are similarly affected.
- Deliverable:** Documented review of site-level procedures
- Due Date:** March 28, 2013
- Action #3:** Perform extent of condition review of all facility-level EIPs on site to determine if Remain Indoors announcements appropriately address similar buildings.
- Deliverable:** Documented review of all EIPs
- Due Date:** March 28, 2013
- PI #2:** The protective action announcements for earthquakes in F/H Area Laboratories' procedure include information that is no longer considered appropriate guidance, specifically the direction for employees to "get under sturdy furniture or in a doorway frame." Standing in a doorway during or immediately after a seismic event is no longer appropriate. To address this, the following actions will be taken:
- Action #1:** Complete revision of L2-1-EPIP-002 and L2-1-EPIP-003 to remove the guidance to stand in a doorway from protective action announcements.
- Deliverable:** Approved revisions to the two listed procedures
- Due Date:** March 28, 2013
- Action #2:** Perform extent of condition review of all EIPs on site to determine if other facility procedures contain direction to employees to stand in doorways. (Note: This review can be accomplished as part of PI #1, Action #3)
- Deliverable:** Documented review of all EIPs
- Due Date:** March 28, 2013
- PI #3:** Employee level of knowledge with respect to taking protective actions is less than desired.
- Action #1:** Provide information to DOE-SR Environmental Management (DOE-EM) facility employees in F-Area, as well as WSB employees, about protective action meanings and required actions.
- Deliverable:** F-Area Protective Actions Response brochure
- Due Date:** February 28, 2013



**PI #4:** While it is true that remaining indoors is better than remaining outdoors, more can be done to ensure the maximum feasible protection is being provided in F-Area structures following a release from Building 235-F.

**Action #1:** Establish a multi-disciplinary team to identify and evaluate possible methods to improve the effectiveness of Remain Indoors as a protective action from a radiological release from the 235-F facility affecting F-Area.

**Deliverable:** Documented evaluation of possible methods and a plan for implementing the improvements judged to be the most effective.

**Due Date:** April 30, 2013

The actions for these PIs will be tracked to completion in the Site Tracking, Analysis, & Reporting system (STAR).

The PI below was specifically identified during interviews of MOX personnel. This PI will be addressed by MOX and will not be tracked in STAR.

**PI #5:** Generically, craft and office personnel are aware of what they should do in the event of an alarm. However, there is a disconnect between "Remain Indoors" and "Sheltering". Some remedial training is necessary to ensure that personnel have a good distinction between Remain Indoors and Shelter.

NNSA-SRSO will verify closure of this PI and will notify DOE-SR when closed.

## **Conclusions**

The conclusion of this assessment is that existing plans and procedures provide adequate guidance to determine and implement appropriate initial and follow-on protective actions. This conclusion is based on the statements below:

1. Because of the combination of a short time from the start of a release to the onset of exposure and the consequences postulated in Reference 1, Remain Indoors is the only viable initial protective action.
2. Longer-term protective actions are focused on moving employees away from the hazard, after a plume has passed, minimizing the exposure potential for those personnel directed to Remain Indoors.
3. The ability of facility-level and site-level ERO members to implement the procedural guidance appropriately will be determined through drills and exercises. Opportunities for improvement identified through the conduct of drills and exercises will form the basis for changes to the protective action strategy and implementing procedures.

Additionally, sufficient space is available in each facility to provide some level of protection until the plume passes and relocation can be accomplished safely and in a controlled manner. The level of protection provided cannot be quantified, but the qualitative judgment of SRS is that

the level of protection provided by remaining indoors until a plume passes outweighs the risks associated with attempting evacuation in the limited time available until the start of exposure.

As stated earlier, the unique set of circumstances at 235-F present a challenge with respect to protection of workers. However, the protective action strategy currently employed is judged to be adequate and effective for most radiological releases, though improvements in the effectiveness during releases from 235-F may be possible and will be pursued.

## **References**

### **Cited References**

1. U-BIO-F-00002, *Basis for Interim Operation for Building 235-F Surveillance and Maintenance*, Rev. 0, Savannah River Site, Aiken, SC, October 2012
2. Manual E7, *Conduct of Engineering, Procedure 2.25, Functional Classifications*, Rev. 20, Savannah River Site, Aiken, SC, November 2012
3. DOE Order 151.1c, *Comprehensive Emergency Management System*, U.S. Department of Energy, Washington, DC, November 2, 2005
4. SCD-7, *SRS Emergency Plan*, Savannah River Site, Aiken, SC
5. DOE G 151.1-4, *Emergency Management Guide, Response Elements*, U.S. Department of Energy, Washington, DC, July 11, 2007
6. Manual 6Q, EMPP 6Q-001, *Standards for Development and Maintenance of an Emergency Planning Hazards Assessment (EPHA)*, Rev. 10, Savannah River Site, Aiken, SC, November 2010
7. Manual 6Q15.1, EPIP-103, *Protective Actions*, Rev. 15, Savannah River Site, Aiken, SC, September 2012
8. Manual 6Q15.1, EPIP-300, *Command Operations*, Rev. 23, Savannah River Site, Aiken, SC, June 2011
9. Manual 6Q15.1, EPIP-825, *Consequence Assessment Operations*, Rev. 7, Savannah River Site, Aiken, SC, November 2012
10. DCS01-APP-DS-MAN-H-40018-7, *MOX Services Emergency Response Manual*, Rev. 7, November 2012
11. FEMA P-361, *Design and Construction Guidance for Community Safe Rooms*, Second Edition, August 2008
12. L2-1-EPIP-002, *F-Area Complex Emergency Response*, Rev. 13, Savannah River Site, Aiken, SC, November 2012
13. L2-1-EPIP-003, *AEC Emergency Response Actions*, Rev. 2, Savannah River Site, Aiken, SC, November 2012

## **Additional Documents Reviewed**

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2. 6Q8-4.1-EPIP-HLW-111, *FEC Emergency Response Actions*, Rev. 10, Savannah River Site, Aiken, SC, January 2012
3. SCD-7, *SRS Emergency Plan, Annex C, F-Area Annex*, Rev. 11, Savannah River Site, Aiken, SC, October 2012
4. SCD-7, *SRS Emergency Plan, Annex E, Liquid Waste Organization*, Rev. 8, Savannah River Site, Aiken, SC, July 2011