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Material Control & Accountability Activities Associated with the FB-Line Deactivation and Downgrade to an Inactive Category IV Material Balance Area.

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Abstract

The Savannah River Site (SRS) is currently in the process of Deactivation and Decommissioning (D&D) several processing areas on site. One of these areas is the 221-F Canyon Complex which includes the FB-Line Material Balance Area (MBA). This paper addresses the Material Control and Accountability (MC&A) activities that were developed and implemented to downgrade the FB-Line MBA from an active Category I facility to an inactive Category IV MBA. MC&A downgrade requirements developed address topical areas that can impact final facility closure milestones. Final operational activities to process the remaining nuclear material in the facility needed to be coordinated with MC&A closure activities to minimize the amount of time and cost associated with the closure of the FB-Line facility. MC&A activities that needed to be addressed included: the decommissioning of process areas, transfer of accountable nuclear material to other facilities, the material hold-up measurements required once process areas were shut down, the access requirements to nuclear material during the final processing and simultaneous closure of processing areas, the usage of enhanced material surveillance requirements to improve the utilization of Operations personnel, the updating and record retention for accountability records, the transition to a lower category MBA for final deactivation activities which included phasing out security force personnel, and the establishment of an administrative/inactive MBA once all deactivation activities were completed.

Introduction

The Department of Energy (DOE) has approved that the Savannah River Site's (SRS) F Canyon Complex to terminate operations, de-inventory all processing areas, and place the area in a static mode by 2006. The main process area in the F Canyon Complex is the FB-Line facility. This facility began processing in the 1950's with a multitude of missions over the years. One of the main missions included the operation of the Plutonium Uranium Extraction (PUREX) process which included both bulk/liquid and item production lines.

The FB-Line facility is currently a category I MBA. The PUREX operation was suspended in 2002 and operations within the facility has shifted to the processing of material to meet the DOE 3013 program requirements for "Stabilization, Packaging, and Storage of Plutonium-bearing materials".

This paper addresses the Material Control and Accountability (MC&A) activities that were developed and implemented to downgrade the FB-Line MBA from an active Category I facility to an inactive Category IV MBA.

Safeguards Goal

It was determined early on that the MC&A activities associated with the deactivation of the FB-Line facility could have a major impact on the scheduled activities within the facility to meet the F Canyon Complex Deactivation Plan. A goal was established to identify and incorporate all

required safeguards requirements into FBL deactivation plans so that there would be no surprises during the deactivation process. This would also allow facility personnel to manage MC&A / safeguards tasks to minimize both time and cost impacts.

Two major safeguards goals would need to be met within the deactivation process for FB-Line. These goals are:

1. Downgrade to a Category IV MBA and Property Protection Area (PPA)
2. Establish a static Category IV MBA

The downgrade to a category IV MBA is the main safeguards area of concern along with being the key driver to minimize the cost impacts within the facility. Once approval is obtained to downgrade to a category IV MBA then all of the protective force personnel within the facility can be reassigned to other areas at SRS. This will also minimize access control requirements allowing for additional un-cleared personnel to be assigned to the facility to complete required deactivation activities.

Safeguard requirements also addressed the conflict of activities taking place within the facility as part of the FB-Line deactivation process. Operational activities in the facility were increasing to process the remaining material stored within the facility to meet the 3013 requirements and disposition of additional legacy materials while at the same time old process lines and storage areas were being cleaned out and deactivated. Controls need to be developed and implemented to allow both activities to simultaneously occur within the facility.

Identification of S&S Program Requirements

Identification of required safeguards & security (S&S) activities was determined through the usage of an 11 person task team. The team included members from all associated organizations that would be impacted by the conduct of safeguard tasks associated with deactivation program requirements within the FB-Line facility. Members were not only from different programmatic groups but also included personnel from all three main organizations at SRS as noted below:

1. Westinghouse Savannah River Company (WSRC)
Operations, NDA Measurement, Area MC&A, Site MC&A, and Site Security
2. Department of Energy – Savannah River (DOE-SR)
Operations, Site Safeguards & Security/MC&A
3. Wackenhut Services Incorporated (WSI)
Programs & Planning

The main objective of the team was to clearly identify all required S&S tasks associated with downgrade of the FB-Line facility to a Category IV MBA and then place the facility in a “cold, dark, and dry” condition. The MBA would remain within the site’s accountability system as a static facility. It was stressed that we were not terminating safeguards on any material remaining in the facility. The majority of this material would be in the form of equipment holdup remaining after all production and/or process lines were cleaned out.

All S&S program topical areas were included in the review process. These areas included MC&A, Physical Security, Computer Security, and Information Security. The task team utilized DOE Order requirements, team member’s S&S program knowledge, and operation’s team members processing & deactivation program knowledge to develop a list of S&S task requirements to meet the two main objectives as noted above. Through the usage of table top

discussions, a comprehensive list of S&S tasks were developed and agreed upon by all team members (See Table A for abbreviated list). This was the basis for the development of a Memorandum of Understanding (MOU) between all three organizations represented within the S&S task team.

Coordination of Activities

To minimize the impact of S&S activities within the facility and reduce associated security cost, the S&S deactivation task team also established the ground rules in which the safeguards requirements would be accomplished. These ground rules included the implementation of 1) phased S&S walk downs, 2) simultaneous reviews by all organizations, and 3) MBA categorization methodologies to downgrade to a Category IV MBA.

A major goal associated with minimizing security costs associated with the deactivation program within FB-Line is to eliminate the need for the physical security protective force personnel immediately upon the transfer of the last 3013 program and/or legacy material from the facility. This should take place within a day(s) of the last material transfer from FB-Line facility. For this to take place, waiting for the last shipment of material to leave the facility before starting any safeguard reviews would not be practical. Thus, the concept of using phased safeguard review concept within the facility will be implemented as different production lines (sub-areas) are deactivated. With many of these sub-areas already shut down, deactivation activities have already been started which support the phased safeguards review concept. An example of one of these sub-areas is the PUREX production line.

It was also agreed upon that all three companies (WSRC, WSI, and DOE) would be part of each safeguards review/walk-down team. This simultaneous review would ensure that any safeguards or MC&A issues within an area would be addressed prior to the final deactivation tasks being completed in the respective area. It also keeps all three groups abreast of conditions and activities taking place to ensure that proper safeguards controls are being maintained during the MBA downgrade process and desired final results will be met.

MBA Re-Categorization

An area that needed to be well defined up-front was the methodologies that were to be used to determine the new category of the FB-Line MBA. Other than a few sources and standards to support the future measurement of waste during clean-up activities, there will be no material remaining in the facility other than in the form of equipment hold-up. During the deactivation process all items will be removed from the facility, process lines flushed out, glove-boxes cleaned of residual material, and existing waste items removed.

Both current and historical process flow diagrams for FB-Line were reviewed by the S&S Task Team to identify where there was a potential for hold-up to remain in the facility. Through these reviews over 160 areas within the facility were identified that would need to be addressed during the re-categorization. These areas included tanks, glove-boxes, ventilation systems, etc. Several of these areas had not operated for over ten years and were cleaned out when they were initially shutdown.

Accountability values for each of these identified hold-up areas will be based on a combination of historical process data and NDA measurements. The FB-Line Engineering organization provided a synopsis of current and historical conditions in each of the 160 plus areas that have been identified with potential hold-up material. Each area was clearly identified as to how the

accountability values for the holdup would be calculated. It was also agreed upon by the S&S Task Team that each area would be entered into the site's accounting system to ensure that the material was clearly identified and a complete audit trail was established. This would help support any demolition work that may take place in the future.

Concerns related to the assignment of attractiveness levels and roll-up of holdup materials remaining in the facility were also addressed. The S&S Task Team agreed with only hold-up material remaining in the facility, that it would be extremely difficult to remove any large quantities of material without demolishing and dismantling of process lines and equipment. Thus the normal summing up of all accountable nuclear materials (items) within an MBA did not properly reflect the conditions anticipated in the MBA or the level of security that would be required for a decommissioned static facility. After a lot of discussions between the DOE-SR MC&A office and facility MC&A personnel, it was agreed upon that the roll-up of the remaining hold-up material in the facility was not credible and each area would be treated independently.

The material's attractiveness level for each of the 160 plus areas identified in the facility would be the main driver for the assignment of material categories within each area. Each area containing hold-up material would need to maintain a category IV assignment.

Per DOE M 474.1-1B, Manual for Control and Accountability of Nuclear Materials, a plutonium bearing material with an attractiveness level of "C" could have less than 400 grams of material and maintain a level IV category assignment. Even though the majority of the attractiveness levels for the hold-up areas are anticipated to have an "E" level, by setting a limit of 400 grams during the review process this would ensure that even at a very conservative attractiveness level of "C", the area would maintain its category IV level. This also eliminates many debates that could arise concerning the assignment of attractiveness level and help to expedite the down grade review process.

If a process area's identified material hold-up is determined to have 400 grams or more material after all clean-up activities are completed, then this area will require additional reviews before it can be assigned a category IV level. A walk-down review team (as described below) will assign an attractiveness level of "E", "D", or "C" directly to each of these respective area(s) and determine the category of the material per DOE M 474.1-1B limits. If an area is determined to be at a level greater than category IV, then additional cleanup / decommissioning activities will be required to bring the area down to the category IV level requirements.

With the implementation of the phased review process, the final MBA's categorization will simply be reviewing that each of the 160 plus areas with hold-up material has independently met the category IV level requirements.

Walk-Down Team Activities

Joint walk-down teams will also be utilized to review each processing area as it is deactivated and readied for final closure. These walk-down teams will consist of personnel representing the same companies and organizations that were included on the original S&S Task Team that established the safeguards requirements to deactivate the facility. The walk-down team(s) will support the phased deactivation review concept where subsections of the FB-Line facility will be de-inventoried and deactivated while other areas are continuing to operate.

An established checklist of activities has been developed to ensure that a complete review of each area is conducted by the walk-down team during the review process. These activities will include reviewing the following topical areas for each process area within the MBA:

1. Deactivation / decommissioning activities and supporting documents
2. Hold-up measurement status and supporting documentation
3. Accounting system review for hold-up & remaining items
4. Other S&S equipment concerns and / or removal
5. Physically walking down each area to observe existing conditions
6. Securing of completed sub-areas upon completion of reviews

The securing of each sub-area upon completion of the safeguard review is a critical step during the deactivation process due to the fact that there will be ongoing material processing taking place within other areas of the FB-Line MBA. Each sub-area will be physically sealed off for contamination controls, locked utilizing a controlled lock & key program, and TID sealed to ensure that no other material is introduced into these areas that have had the final safeguards walk-downs completed. Utilizing a joint walk-down team will also expedite the identification of any areas of concern from WSRC Operations, WSRC Safeguards & Security oversight, WSI Security Programs, or DOE-SR Safeguards & Security program personnel. Concerns will be quickly addressed and resolved by all parties on the walk-down team.

Additional Safeguard Controls

Additional MC&A and physical security controls needed to be addressed for material access controls within the FB Line facility to meet the required milestones within the F-Canyon Complex Deactivation Project Plan. Deactivation and cleanout demands precluded usage of “L” cleared personnel within the Category I MBA. This resulted in re-addressing material access controls throughout the entire FB-Line MBA’s material access area.

Through this review process, enhanced safeguards controls have been designated to be placed on process areas where access to category I and II quantities exist. These controls include the usage of the following:

1. PSAP/HRP qualified personnel within critical processing areas
2. Two-person rule for direct material surveillance
3. Four person team to escort non-PSAP/HRP personnel in critical areas
4. Physical security screening for entry and exit of key process areas

These new programmatic controls within the MBA were reviewed by the vulnerability assessment team assigned to FB-Line and documented in a modified security plan (MSP). The MSP helps to ensure that everyone understands the changing conditions within the facility and that proper safeguards are being implemented to adequately protect higher attractiveness level material within the facility.

The implementation of the new controls allows for the conduct of deactivation activities by “L” cleared personnel in areas that have already been shut down even though they are within the material access area.

Summary

A well defined program to address Safeguards & Security / MC&A activities associated with the deactivation of the FB-Line facility to a static category IV MBA is a critical step in achieving the F-Canyon Complex Deactivation Project Plan milestones. By working as a unified team (amongst the SRS operation's contractor - WSRC, the physical security contractor - WSI, and DOE-SR Safeguards & Security) the impact of safeguards and security tasks can be minimized. Deactivation schedules for the facility activities include all safeguards and security requirements and are an integral part of the F Canyon Complex Deactivation Plan.

References

1. DOE Manual 474.1-1B, Manual for Control and Accountability of Nuclear Materials, June 24, 2003
2. F-Canyon Complex Deactivation Project Plan, V-PMP-F-0010, Revision 1, March 2003
3. F-Area Closure S&S Task Team #3 Results and Memorandum of Understanding, NMM-PRG-2004-00202, Rev. 0, March 3, 2004
4. Implementation Plan for the Reducing Safeguards at 221-FB-Line, Draft dated May 3, 2004

* The information in this article was developed during the course of work under contract No. DE-AC09-96SR18500 with the U.S. Department of Energy.

Table A
S&S Requirements for the Deactivation of FB-Line

MC&A Program Tasks

Before Downgrade

- Development of S&S Shutdown plan
- Removal of all material from process areas and vaults
- Removal of accountable sources and standards from MBA
- Clean out of all process areas (glove boxes, tanks, waste, etc.)
- Completion of equipment holdup measurements
- Conduct joint WSRC & DOE & WSI facility walk down and review for downgrade to Category IV MBA– Phased process as D&D activities are conducted
- Conduct MBA categorization reviews and obtain DOE MC&A concurrence
- Obtain DOE MC&A approval to downgrade to category IV MBA
- Inform security contractor (WSI) of established target downgrade date

After Downgrade

- Revise FB-Line MC&A Plan for a Category IV MBA
- Cancellation of any active Deviations
- Removal of NDA equipment (as needed)
- Return of all unused TID seals to site MC&A (as needed)
- Facility Lifetime Mass Balance Calculations
- Archive of MBA accountability records
- DOE final concurrence for static FB-Line MBA

Physical Security Tasks

Before Downgrade

- MSP for access controls during joint processing & deactivation activities
- Establish access control program for Cat IV MBA

After Downgrade

- Cover up and/or removal of all security postings / signs for MAA
- Remove FB-Line from F-Area SSSP & add to General Site Security Plan
- Removal of all security seals from doors and review lock & key controls
- Deactivate &/or removal of electronic personnel access control system
- Removal of SNM/Metal portal monitors
- Transfer of product transfer carts to other MBAs
- Cancellation of defunct MSPs and deviations
- Removal of any special physical security equipment
- Review personnel assignments to the PSAP/HRP program
- Archival of physical security plans and records

WSI Tasks

Before Downgrade

- Notification of anticipated down grade date
- Monthly status check of projected downgrade
- Update response plans, post orders, etc. as needed with changing conditions

After Downgrade

- Reassignment of security personnel
- Removal of security equipment
- Update response plans, post orders, etc. as needed with downgrade of MBA

Computer Security Tasks

Before Downgrade to PPA

- Removal of classified computer system(s)
- Removal of STU III Phone(s)

After Downgrade

- Deactivation or transfer of classified accountability workstations and encryption units

Information Security Tasks

Before Downgrade

- Removal, archival, or destruction of all classified documents in within facility
- Removal and deactivation of all GSA repositories in FB-Line
- Ensure all UCNI / OOU documents are being locked / secured