

**This document was prepared in conjunction with work accomplished under Contract No. DE-AC09-96SR18500 with the U. S. Department of Energy.**

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**DOWNGRADE OF THE SAVANNAH RIVER SITE'S FB-LINE**

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**ABSTRACT**

This paper will discuss the Safeguards & Security (S&S) activities that resulted in the downgrade of the Savannah River Site's FB-Line (FBL) from a Category I Material Balance Area (MBA) in a Material Access Area (MAA) to a Category IV MBA in a Property Protection Area (PPA). The Safeguards activities included measurement of final product items, transferal of nuclear material to other Savannah River Site (SRS) facilities, discard of excess nuclear material items, and final measurements of holdup material. The Security activities included relocation and destruction of classified documents and repositories, decertification of a classified computer, access control changes, updates to planning documents, deactivation and removal of security systems, Human Reliability Program (HRP) removals, and information security training for personnel that will remain in the FBL PPA.

**MC&A*****Deinventory of FB-Line***

Approximately 1000 DOE-STD-3013 compliant containers of plutonium and uranium metal and oxide were transferred to other SRS facilities. The Special Nuclear Material (SNM) that went into these containers did not all originate in FBL. Besides FBL, the SNM also came from sources like Rocky Flats, the 1970's and 1980's Consolidated Scrap Management Operations (CSMO) program, and recent shipments from other DOE and SRS facilities.

The SNM content and isotopic distribution of these items were measured by destructive analysis, a neutron multiplicity counter, a calorimeter, and/or near field high purity germanium isotopic system. Nondestructive analysis (NDA) was preferred over destructive analysis due to

- 1) better timeliness of results (support an accelerated schedule)
- 2) no sampling error issues (better results relative to control limits), and
- 3) less expensive (cost effectiveness)

The results of these measurements were analyzed by the MC&A statistician to determine whether the SNM values fell within individual Combined Limits of Error (CLOE) with the expected book values as well as within the Limit of Error of the Inventory Difference (LEID) of the batch of several containers. These analyses were performed within several days of production for the CLOEs and approximately one week for the LEIDs. If items or batches were out of limits, those items were not allowed to progress through the production process. Resolution of the out of limit condition usually consisted of a calorimeter/gamma isotopic measurement. This analysis process is described in more detail in a paper by D. J. Campbell and the measurements are described in a paper by L. Baker both presented at this Annual Meeting. Additionally, weight checks were performed at every stage of the production process and any out of limit situation resulted in an immediate cessation of production operations until the anomaly was resolved. This abrupt detection and the many inventory

evaluations were the key reasons why the inventory frequency for this portion of FBL was reduced from every two months to every six months.

While most of the SNM throughput went into 3013 containers, and were measured, analyzed, and dispositioned relatively easily, some low SNM content CSMO and FBL glovebox sweeping material required more measurements, analysis, and disposition planning and activities. A higher percentage of these items, 100% in the case of sweepings items, required calorimetry to arrive at an SNM value that was reasonable and within limits. There were two main reasons for the need for calorimetry:

- 1) the presence of significant quantities of low Z material resulting in extremely high ( $\alpha, n$ ) rates that the neutron multiplicity counter could not overcome, and
- 2) inadequate input SNM values, especially when dealing with material shipped to SRS in the 1950's to 1970's.

The final Category III and above materials removed from FBL were standards, sources, and other material. These materials were the last to be shipped from FBL for four reasons:

- 1) they were needed to verify proper operation of the NDA equipment,
- 2) they required more time to develop disposition paths due to the unusual composition of some of the material (unusual material or containers that could not be dissolved or required other facilities to revise their Authorization Basis documents),
- 3) some of the material required special authorizations (MC&A and or Waste Management) to dispose, and
- 4) some items were shipped from SRS as a result of positive responses to SRS advertisements.

Once the inventory books reflected a Category IV quantity (two weeks after the final Category I shipment), four months ahead of the baseline schedule, and one month ahead of the accelerated schedule, a physical inventory (PI) was conducted to ensure FBL was a Category IV MBA. This PI was observed by DOE-SR MC&A as part of the FBL Downgrade Survey. The PI was conducted and reconciled in the same manner as the previous Category I PIs. To no one's surprise, the reconciliation required much less time than the Category I PIs. DOE-SR approved the downgrade of FBL the next workday, and the Protective Force left FBL the day after that. Shortly thereafter the Material Surveillance, Daily Administrative Check, and Tamper Indicating Device requirements were removed from the operating procedures.

### ***Holdup***

The only SNM left in FBL is waste, a small number of standards and sources, and plutonium oxide and plutonium residues held up in the numerous gloveboxes, tanks, sumps, piping, and ducts. All credible rollup locations contain less than 400 grams of attractiveness level C material or less than 3000 grams of attractiveness level D material.

Holdup measurements for processing areas had been accomplished in accordance with the routine PIs of FBL. Final holdup measurements were completed after glovebox processing ceased. These final holdup measurements were to demonstrate that no quantity of plutonium greater than Category IV existed in FBL. Prior to the DOE-SR Downgrade Survey the final holdup measurements were analyzed and reported.

These final holdup measurements were very important to the Downgrade of FBL because the routine PI holdup measurements revealed that some gloveboxes contained more than 400 grams of oxide. To get below the Category IV limit an extensive campaign to sweep the gloveboxes was initiated as 3013 production was ending. This campaign generated 136 sweepings items that were measured before being shipped to other SRS facilities. These sweepings were the greatest challenge to the deinventory schedule. The campaign generated approximately three times as many items as expected, and these items had to be measured by calorimetry/gamma isotopics due to the excessive ( $\alpha, n$ ) reaction rates. Only a heroic effort in calibrating a transmission corrected gamma instrument using calorimetered secondary standards and quickly acquiring two additional calorimeters was able to recover the schedule. After the sweeping campaign, all gloveboxes measured less than 400 grams of attractiveness level C material.

Four non-glovebox areas contain more than 400 grams of plutonium holdup. They are: D-1 Dissolver, A Precipitator Sump (and hence cabinet), underneath B Precipitator Sump (in the concrete floor), and Cation Sump (90 feet). These areas were evaluated more closely and determined that the attractiveness level of the material is at most D and thereby subject to the 3000 gram Category IV limit, so no further cleaning was required.

## **SECURITY**

The Security portion of the Downgrade of FBL was not nearly as technically challenging or operations-dependent as the MC&A portion. The challenge in Security was the detailed planning and coordination required to ensure many very different tasks by different contractors and different DOE program elements were completed at the same time or in logical succession to allow the Security Downgrade to occur coincidentally with the MC&A Downgrade.

The Site Safeguards and Security Plan (SSSP) and the Facility Description and Report (FDAR) for FBL were contained in the F-Area SSSP and FDAR which included another Category I facility. The FBL portions were removed from the SSSP and the new Category IV FBL and F-Area PPA Security requirements were documented in a Modified Security Plan (MSP). The only revision to the FDAR was to change the F-Area contact to the Security Manager for the other Category I facility. F-Area was downgraded from a Limited Area to a PPA coincident with FBL being downgraded from a Category I MBA in a MAA to a Category IV MBA in a PPA. All other FBL MSPs and Deviations were canceled.

Almost all the Security Systems were either deactivated, masked from Central Alarm Station view, or put in 'Access' immediately after the departure of the Protective Force. Much of the equipment was removed to be used as spare parts for the remaining Category I facilities at SRS. A few Security Systems remain active to provide access control. However, soon FBL will be removed from the Electronic Safeguards & Security System network at which point the systems will fail secure. Those doors for which access is required to carry out Surveillance and Maintenance of FBL are being modified to allow key entry.

Since FBL was being downgraded to a PPA, all classified matter and the one classified computer were removed. Again, this required proper timing and coordination since Operations and the Protective Force required classified documents up to the time of Downgrade. Repositories, shredders, and copiers were removed and either redeployed to other facilities or sent to excess equipment storage. The decertification and removal of the classified computer was not a critical timing issue since it was used in a part of the production process that was completed several weeks before the Downgrade.

Within one month the HRP Plan was canceled and FBL personnel removed from the program. One month was needed to allow certified FBL personnel to be redeployed to the other SRS Category I facilities without a lapse in certification.

Finally, for the two months before Downgrade, FBL personnel were trained on the protection of Sensitive Unclassified Information (SUI) in a PPA rather than in an MAA. It was clear during this training that personnel were going to miss the 'automatic' protection afforded to SUI by an MAA.

## **SUMMARY**

Early coordination with and setting of clear goals and expectations by all stakeholders, the DOE, Protective Force, contractor oversight, Operations, Engineering, and Safeguards & Security resulted in a smooth Downgrade Survey.

Upper Management, Operations, and the FBL facility schedule were very focused on moving out Category I items, so there was very little doubt that that part of the schedule would slip. However, the critical path to Downgrade also included

1. measuring and dispositioning unique, odd items that required a lot of technical support time and effort,
2. holdup measurements because they had to wait for processing to complete and all stakeholders wanted to downgrade as soon as possible after the completion of processing, and
3. dispositioning standards because this had to wait for the measurements of the Category I material to be complete.