POLLUTION PREVENTION, WASTE MINIMIZATION AND MATERIAL RECYCLING SUCCESSES REALIZED DURING SAVANNAH RIVER SITE'S K AREA MATERIALS STORAGE (KAMS) PROJECT, W226

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ABSTRACT

As DOE continues to forge ahead and re-evaluate post cold war missions, facilities that were constructed and operated for DOE/DOD over the past 50+ years are coming to the end of their useful life span. These various facilities throughout the country had served a very useful purpose in our nations history; however, their time of Cold War materials production has come to an end. With this looming finalization comes a decision as to how to remedy their existence: D&R the facilities and return to "Greenfield"; or, retrofit the existing facilities to accommodate the newer missions of the DOE Complex.

The 105-K Reactor Building located at the Savannah River Site in Aiken, South Carolina was retrofit on an accelerated project schedule for a new mission called K-Area Materials Storage (KAMS). Modifications to the former defense reactor's building and equipment will allow storage of Plutonium from the Rocky Flats Site in Colorado and other materials deemed necessary by the Department of Energy. Proper project planning and activity sequencing allowed the DOE and the Westinghouse Savannah River Company to realize savings from: the recycling and/or reuse of modified facility components; reduction and reclassification of waste; reduction in radiological area footprint (rollbacks).

INTRODUCTION

The KAMS Project Team overcame typical large-scale project management theories involving disposal of D&R materials. By instituting multi-support teams to analyze project task scope, alternatives were developed which countered traditional "throw it all away" strategies. Continuous P2 planning throughout all phases of the project allowed "best practices" to be investigated and incorporated during completion of work activities.

For each phase of the project, the "team" recruited various experts to assist in proper planning and oversight of the upcoming activities to ensure each variable of a specific task could be addressed to ensure the right approach to waste minimization, Pollution Prevention and task efficiency was achieved. Over the course of the project, participants from Construction, Operations, Radiological Controls (HP), Environmental Compliance, Waste Management, Property Management participated in the "multi-support team" project approach, lending their experience and providing input towards the project completion.

The team's number one effort was to reduce the total amount of waste generated. As depicted in the bar chart below, the team was successful in achieving this overall goal; however, the chart does not indicate the various challenges encountered. This paper is an attempt to hit the highlights of those challenges and describes some of the successes realized during the project.

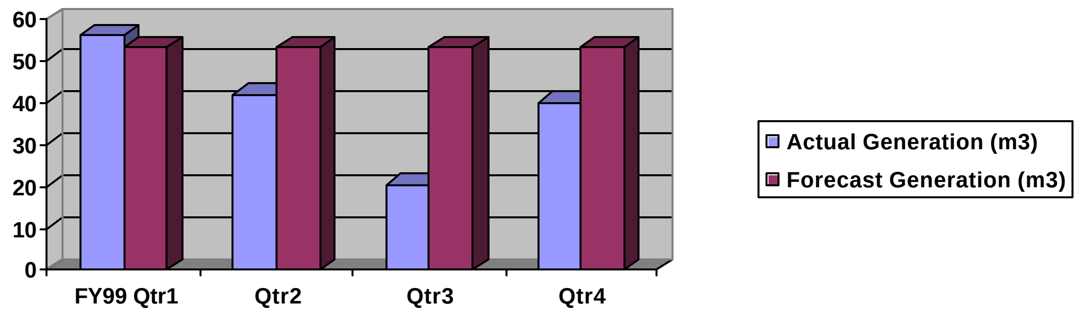

Fig. 1. KAMS Waste Generation vs. Forecast

RECYCLING/REUSE OF MODIFIED FACILITY COMPONENTS

Facility modifications made many different types of equipment available for reuse on site or made available for excess. This equipment was originally located in both Contamination Areas and Radiological Buffer Areas. These items were surveyed and decontamination performed as required. The equipment consisted of two manlifts, two process tanks, one chemical mixing tank and associated components, reactor fuel handling equipment, two radiation harden cameras and steel from reactor room shield doors. Twenty-five cubic meters (25 m3) of Low Level Waste was avoided resulting in savings of $93,500 in waste treatment, storage and disposal costs.

Camera Re-use

One of two radiation hardened cameras removed from the reactor room. These two cameras are being reused on the Savannah River Site in two Radiation Areas to allow facility surveillance's to be completed without personnel entry; thereby, promoting ALARA principals while maximizing facility manpower efficiency.

Fig. 2. RAD Hardened Camera

Steel Re-use

Original project scope called for the disposal of 135 tons of contaminated steel removed from the reactor building. Project P2 planning required D&R for the material. Approximately 108 tons were reused in project modifications for new equipment fabrication, resulting in material savings exceeding $47K. Additionally, steel not used was surveyed, stripped and characterized; allowing release to other users on site, or sold as scrap metal for off-site use.

Fig. 3. Steel Re-sizing

Tank Re-use

Various tanks required disposal following removal from the KAMS process area. To avoid waste generation issues from a tank cut-up program to attain volume minimization, one tank was qualified as a waste container and filled with KAMS waste prior to shipment to the TSD. Another vessel was cleared and reused in another process on site, creating a win-win for all parties involved (incorporating waste avoidance and reuse).

Fig. 4. Salvaged Tank for reuse

The KAMS Project Team overcame typical large-scale project management mindsets involving large-scale disposal of D&R materials. Continuous P2 planning throughout all phases of the project allowed "best practices" to be investigated and incorporated, resulting in reduction of low level waste disposal volume through recycling and material reuse.

REDUCTION AND RECLASSIFICATION OF WASTE

It was evident early in the project's development phase that incorporating a sound waste minimization effort could have a major influence on overall project costs. Reduction of disposal costs would allow redirection of this portion of the budget to compensate for unanticipated waste costs– or additional project scope – later on in the schedule. As the project progressed, the team began to understand which D&R activities could contribute the biggest "bang for the buck" in terms of disposal costs. Two activities in particular came to the front; the removal of the two 54 ton shield doors, and the lowering of the reactor facility's effluent stack.

Removal of Shield Doors

One of the largest challenges to the Project Team came early in the planning process, removing two 54 ton shield doors. In addition to the structural/engineering lift issues related to the safe removal of these massive structures in a constricted work area, disposal issues were compounded due to the discovery that the doors were classified TSCA waste due to the paint covering both sides.

The doors were originally designed to work as a structural shield during reactor operation. The KAMS project required unabated access between the various storage locations, so the doors were to be D&R'ed.

Problems first surfaced with the door removal task when following an extensive sampling campaign, a majority of the construction area was determined to have been coated with PCB laden paint. This substantially increased our disposal costs and minimized our disposal options for the equipment and material involved. Following several meetings with the Site's Environmental Protection Department, Solid Waste Management and Waste Burial Facility Personnel, it was ultimately decided that once the door sections were removed an attempt to remove the painted surfaces would take place using scabbling techniques. The removal of the PCB laden paint was performed to Visual standard No. 2, Near-White Blast Cleaned Surface Finish, of the National Association of Corrosion Engineers (NACE), per 40 CFR Part 761. This allowed us to reclassify the steel as clean and reduced the volume from over 108 m3 of PCB waste to only 0.4 m3. Ultimately reducing our expected disposal costs of $1,371,201 to $13,000.

Fig. 5. Before and After Paint Removal Process

Stack Modification

Project design required the reactor building's exhaust stack height to be reduced by 21 meters due to seismic and tornado concerns. The waste from this task was originally forecasted as Low Level Waste. This was based on past disposal practices and 30 years of effluent ventilation with elevated tritium levels from the stack of an operating nuclear reactor. However, through extensive sampling and meetings with Regulatory Oversight, we were able to reclassify the waste type from Low Level Waste destined for vault disposal and send the 101 m3 of waste created to the landfill. This reclassifying effort resulted in Treatment, Storage and Disposal savings of approximately $378,000 and waste container savings of $36,000.

Fig. 6. Before and After Stack Modification

ROLL BACK EFFORTS

Completing projects and the performance of routine facility operations in radiological areas (i.e. Contamination, High Contamination and Airborne Radiation) is costly. Project costs including facility operations increase due to waste generation, subsequent waste disposal, loss of manpower efficiency, and purchase and use of personal protective equipment.

Planning and proper sequencing of KAMS project activities allowed Low Level Waste generation and personal protective equipment to be reduced during work activities. The KAMS Process Area was originally 1,402 m2 of Contamination Area. An extensive rollback effort requiring a multi-support group team consisting of Operations, Waste Management and Rad Con, was completed allowing 1,033 m2 of CA to be reclaimed as clean.

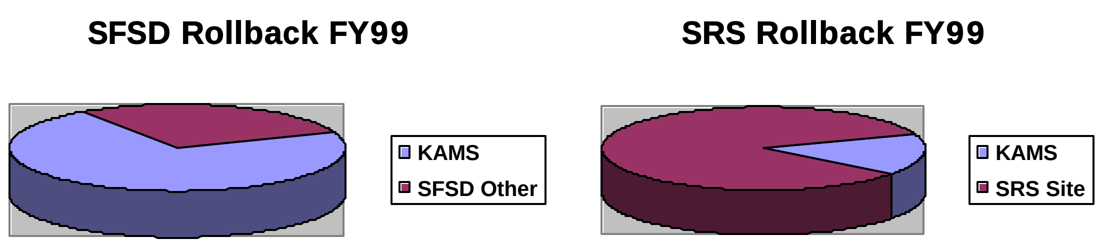

Fig. 7

As depicted above, this highly successful effort resulted in accounting for over 71% of Spent Fuel Storage Division's FY99 rollback goal, and was 16% of Savannah River Site's overall FY99 rollback goal.

The elimination of these Contamination Areas also allows the receipt and storage of materials and associated surveillances to be performed without the use of protective clothing and avoid any additional waste.

Contamination Area Cleanup

Fig. 8. Contamination Area Clean up

The photograph shown to the right was formerly a Contamination Area. Without this area being rolled back to a Radiological Buffer Area, people working here would have to be wearing personal protective equipment. Also, the man-lift and scaffolding would have to be surveyed and released out of the Contamination Area. This area was eventually cleared to a clean area. Two views of the reactor room used for storing Plutonium. This area was formerly a Contamination Area. Activities for the storage of materials, subsequent surveillances and any maintenance activities can now be worked clean using no personal protective equipment and avoiding associated low level radioactive waste generation.

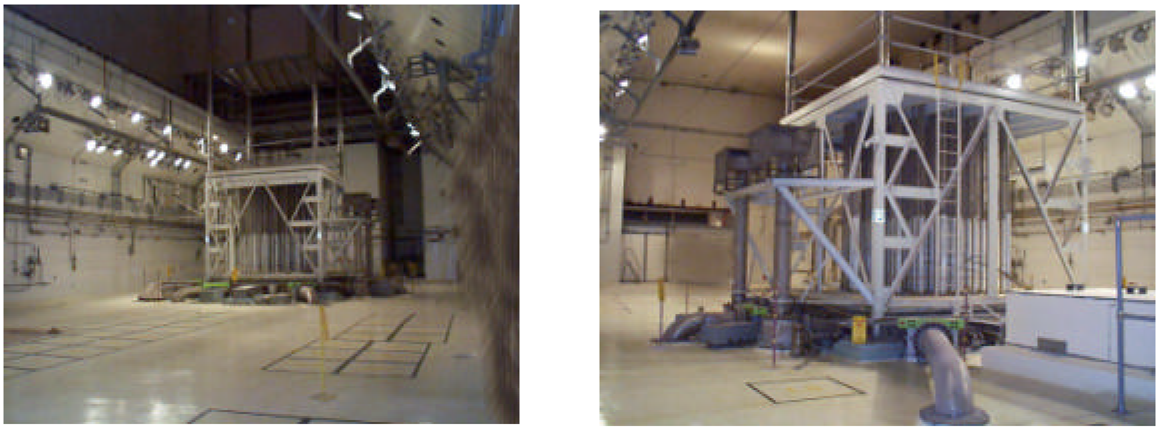

Fig. 9. Final Roll Back Effort

CONCLUSION

Incorporating the multi-support team's Waste Minimization and Pollution Prevention strategies, the KAMS Project had the following benefits to the DOE and Westinghouse Savannah River Company:

- Avoided over 41 m3 of Low Level Waste generation with an associated cost of $153,806 for Treatment, Storage and Disposal due to strategic planning of task sequencing.
- Approximately 108 tons of steel valued at $47,000 was reused for additional project needs
- Through sampling and characterization processes, more than 81 m3 of Low Level Waste was diverted from vault disposal to land fill rubble with savings exceeding $417,000.
- By incorporating proper decontamination practices, reduced 108 m3 of PCB contaminated waste to only 0.4 m3.
- 1,033 m2 of the original 1,402 m2 radiological areas was rolled back and reclaimed as clean
- $292,600 manpower efficiency improvements from the elimination of radiological areas

Due to excellent performance in Waste Minimization and Pollution Prevention strategies, the project and project team was nominated and received recognition in the 2000 White House *Closing the Circle* Awards Program, the 2000 DOE Pollution Prevention Awards Program and the DOE's EM-70 Awards program. The KAMS Project Team has shown by the information presented that proper activity planning and sequencing with awareness to pollution prevention philosophy and techniques will result in tremendous cost and waste savings to the DOE complex.