WASTE MANAGEMENT AT SRS - MAKING IT HAPPEN

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ABSTRACT

The past five years have witnessed a remarkable transition in the pace and scope of waste management activities at SRS. At the start of the new M&O contract in 1996, little was being done with the waste generated at the site apart from storing it in readiness for future treatment and disposal. Large volumes of legacy waste, particularly TRU and Low Level Waste, had accumulated over many years of operation of the site's nuclear facilities, and the backlog was increasing.

WSRC proposed the use of the talents of the "best in class" partners for the new contract which, together with a more commercial approach, was expected to deliver more results without a concomitant increase in cost.

The results have surpassed expectations. The past five years have seen:

- legacy LLW changing from 2700m^3 increase in FY97 to a 2500m^3 decrease in FY01
- construction and operation of waste sorting and supercompaction facilities
- construction of an engineered trench to relieve the pressure on expensive vault space
- commissioning and operation of an incinerator (CIF) which eliminated nearly 2.7M Kgs of waste (mainly Mixed Waste)
- construction and operation of TRU waste facilities
- venting and purging of 11,260 drums of TRU waste
- commencement of TRU shipments to WIPP
- a 25% drop in funding requirements

These results have been obtained by adopting a commercial, fit-for purpose approach in order to achieve more cost effective solutions. This paper charts the successes in the Solid Waste arena and analyzes the basis for success.

INTRODUCTION

The Savannah River Site (SRS) is located on 310 square miles in central South Carolina bordering the Savannah River. The site, established in 1950, was a key facility serving the national security interests of the United States through research and production of nuclear material for national defense, medical use and space missions. With the end of the cold war, site missions changed, with focus now on tritium recycling and storage, nuclear material stabilization, environmental restoration activities, and waste cleanup with emphasis on protecting employee and public health, safety and the environment. Future missions for the 21st century include facilities for the disposition of surplus plutonium, as part of the nation's nuclear nonproliferation effort, Tritium Extraction to support the nuclear weapons stockpile, and pretreatment of HLW in support of the vitrification program to enable tank emptying and closure. These site missions, both present and future, rely heavily on the ability of

waste management to keep pace and provide the necessary infrastructure and facilities to store, treat and dispose of the wastes generated by these missions.

MANAGEMENT APPROACH

The major emphasis in managing solid wastes through the early 1990's was disposal of low level waste (LLW) that met local disposal requirements, and continued storage of problem LLW, Transuranic (TRU) wastes, Mixed Low Level Waste (MLLW) and Hazardous Wastes (HW). Some improvements in disposal techniques were introduced during this time such as the construction of concrete vaults, a next generation disposal technology for LLW wastes, as well as a significant research effort looking at alternative solutions for future waste treatment and disposal programs. Little or no progress was made however, toward real solutions for TRU, MLLW and HW.

In 1996 the DOE signed a new M&O contract with a Westinghouse led corporate team made up of multiple partners bringing a broad range of diversified capabilities to the site. The new contractor team sought to bring together a "best in class" group of companies in a seamless organization with a commercial operating philosophy. BNFL Savannah River Corporation, one of the "best in class" corporate partners has management responsibility for the Solid Waste Division (SWD). Their management approach was clearly defined in the SWD mission statement: *"To provide exemplary, high quality and cost effective Solid Waste Management service in support of Department of Energy (DOE) missions at Savannah River Site (SRS) and across the complex.*

Success in pursuing this mission was founded on several crucial factors; these were:

1. The commercial approach taken by DOE in the new contract and epitomized by genuinely aggressive Performance Based Incentives (PBIs).
2. A clearly articulated expectation by DOE that innovative and commercial approaches would be pursued generally and also encouragement by DOE for the contractor to continually challenge the status quo.
3. While retaining a clear and separate customer oversight role it was jointly recognized that the establishment of an efficient and effective customer/contractor partnership relationship was crucial and appropriate.

While all three factors above were essential to success, DOE-SR and SWD management from the outset made the creation of an open and trusting relationship with each other a very high priority. This was epitomized by establishing open and honest dialogue at all levels for the purpose of communicating information, policy changes, requirements, expectations and performance status. For example the joint involvement in all stages of planning activity ensured customer satisfaction with the Division's direction and is typified by the development of a joint SWD/DOE-SR integrated Divisional System Plan; this in turn is then used as a basis for agreeing on the most cost effective management of both legacy and newly generated wastes and as a basis for aggressive Performance Based Incentives.

The success of this partnership approach is evidenced by the positive results in reducing waste inventory, providing for better forecasting of newly generated wastes and significant reduction in waste generation as a result of waste minimization programs. The following sections of this report provide details on some of the major initiatives resulting in significant progress for the site.

LOW LEVEL WASTE (LLW)

LLW has traditionally been disposed of in trenches and vaults without any treatment or volume reduction. Recognizing the need for more cost-effective treatment and disposal, numerous programs were initiated over the last five years resulting in "better, cheaper, faster" disposition of waste. These efforts, discussed below resulted in going from a 2,700m^3 increase in legacy waste in FY97 to a 2,500m^3 decrease in FY01.

Waste Sorting and Super Compaction

In 1997, about 11,428m^3 of solid low-level waste were received from both on-site and off-site generators. Approximately 2571m^3 of waste (both legacy and new) was sent for off-site volume reduction. The waste was then returned to SRS for disposal in the E-area Vaults. Recognizing that the largest fraction of both legacy and newly generated waste could not be safely sent off-site for treatment, plans were developed for construction and operation of an on-site sort/segregate/treatment facility. During 1998, design, construction and startup of the Waste Sort Facility (WSF) was completed. This facility provided a process for sorting and segregating compactible LLW for volume reduction. Also in 1998, a supercompactor from West Valley was obtained and plans were initiated for installation and operation the following year. This was accomplished in early 1999, paving the way for a five to one volume reduction for compactible wastes. Both of these facilities were provided at a significantly reduced cost through the innovativeness of the project teams. This included the use of existing infrastructure and facilities, and obtaining excess equipment available within the DOE complex to provide "fit for purpose" systems. These two facilities have operated in concert since early 1999 contributing to the increased disposal of Low Level Wastes.

Fig. 1. Waste Sort Facility (WSF)

Development and use of Engineered Trench Design

SRS began the disposal of LLW with extremely low radioactive content in engineered trenches while still protecting the environment and the public in February of 2001. This "drive in " trench located in E-area, is designed to extend the useful life of the existing Low Activity Waste Vaults (LAWV) and allow shallow land burial of selected LLW. It is designed and constructed to safely dispose of ~ 9429m^3 of LLW. A large percentage of waste (~65%) currently in the existing LAWV, is a candidate for the future trench disposal. This allows the more robust LAWVs to be reserved for higher activity Low Level Waste. This work was accomplished in concert with a complete revision of the Performance Assessment for the E-Area LLW Disposal Facilities. As opposed to using conservative textbook values for meteorological and hydrological data to support the development of computer codes, actual data was obtained and provided a much more accurate assessment of the conditions affecting material transport. Additionally a new comprehensive state-of-the art Vadose (unsaturated) Zone monitoring system, provided through a joint development program between SRS, INEEL and the DOE/MLLW Center for Excellence, was implemented and provided accurate soil moisture data to support and validate model performance. This work supported the establishment of new concentration limits for the various disposal units making them more cost effective.

Fig. 2. Engineered Trench

Consolidated Incinerator Facility (CIF)

From 1997 to its shutdown in April of 2000, the CIF processed 764m^3 of LLW. The CIF also processed 0.6M Kgs of mixed waste and 20K liters of PUREX waste before shutting down to provide funding for higher priority missions.

Fig. 3. Consolidated Incerator Facility (CIF)

TRANSURANIC WASTE (TRU)

Historically, TRU waste has been stored at SRS for future treatment and disposal. Numerous storage programs have been used over the years ranging from earthen covered concrete pads containing drums, drums in culverts (higher activity) and large boxes, to RCRA regulated fabric covered buildings for drums and open storage for culverts and large boxes. This waste, which is referred to as legacy waste, had grown to over 11,000m^3. Although project development work had been ongoing since the early 1980's to develop TRU facilities for processing, little or no actual progress had been made. In 1997 however, the TRU program switched gears from just continued storage to a multifaceted program designed to begin retrieval and preparation of containers for shipment to the Waste Isolation Pilot Plant (WIPP) in Carlsbad NM. The following activities reflect this progress in the TRU program.

Drum Retrieval/Vent and Purge

Starting in January 1997 through August of 1999, over 8,500 drums of TRU waste were retrieved from earthen covered mounds, inspected vented and purged of radiolytic gases, and re-stored in aisle-spaced fabric covered buildings. This was a major project activity, completed two years ahead of schedule, eliminating concerns about the condition of these containers, some of which had been under earthen cover for over 20 years. Also these containers, all of which were produced prior to 1986, did not have filter vents installed in the drum lids.

Fig. 4. TR Waste Drums Before Retrieval

Fig. 5. TRU Waste Drums After Retrieval

As part of the retrieval program, all these containers were processed through the Drum Vent and Purge system, where radiolytic gas (primarily hydrogen) was vented and a carbon filter inserted to prevent the recurrence of gas accumulation. Over 11,260 drums were processed through this system (including non-retrieved drums).

Fig. 6. Drum Vent & Purge System

Ship to WIPP

In 1998, a Ship to WIPP effort was initiated with emphasis on developing the process, procedures and facilities to meet the requirements of the WIPP Acceptance Criteria and the New Mexico Resource Recovery and Conservation Act (RCRA) permit. This included the installation of characterization facilities including headspace gas sampling and analysis and non-destructive assay and radiographic equipment. Existing facilities were modified to accept the TRUPACT-II loading platform. A new facility was constructed, the Visual Examination Facility, which provided verification of drum contents identified through radiographic analysis. This facility is another example of "fit for purpose" capability provided at relatively minor cost by using existing infrastructure and equipment. All the information gained from these activities was used to develop an Acceptable Knowledge (AK) report that is necessary to meet the shipping requirements. The site was successful in passing a certification audit in November of 2000.. The first shipment of 42 drums was made on May 8th 2001. Since then, an additional 294 drums (6 shipments) have been made. The site anticipates that the shipment numbers will continue to increase with 12 shipments in 2002, peaking out at 120 shipments in 2023.

Fig. 7. Tirst TRU Waste Shipment to WIPP for disposal May 8, 2001

MIXED WASTE

Major accomplishments have been made recently in the area of Mixed Waste. This is another group of waste streams that for years was limited only to storage. Treatment or disposal capabilities had been non-existent. Only in the last few years have opportunities presented themselves for treating and disposal of these wastes, both in the private and DOE sectors. Numerous shipments for treatment and disposal of different types of mixed wastes have recently been made. These include:

- Two shipments of stabilized ash and blowdown to EnviroCare in Utah, the first shipment in August 2001 followed by a second shipment in October 2001. A total of 368 m^3 of this waste was disposed. This waste was generated as a result of the incineration of listed combustible wastes at CIF.

- A shipment of HEPA Filters from CIF, to Materials and Energy Corporation (M&EC) in Tennessee for macroencapsulation in cement in September 2001. A total of 66m^3 of this waste was treated, then shipped on to EnviroCare for disposal.

- A shipment of PCB contaminated wastes to Oak Ridge for treatment in the TSCA Incinerator in September of 2001. A total of 0.32 m^3 of this waste was treated. This marked the first shipment from SRS to TSCA and represents the opening of a path for treatment and disposal of this SRS legacy waste.

- A shipment of 13,620Kgs of contaminated lead, to Oak Ridge National Metal Recycle Center for recycling in September 2001. An additional 31,780Kgs of contaminated lead is planned for shipment in 2002.

These shipments and others to follow represent the sites commitment to responsibly manage these wastes and to meet the requirements and schedule laid out in the Site Treatment Plan (STP). There are numerous other programs where the Solid Waste Division, in concert with its DOE partner, is making a difference. These include:

- The Hazardous Waste program routinely ships hazardous wastes off site for treatment and disposal and has virtually eliminated all legacy waste.
- Pollution Prevention Program has saved over $100M.
- Behavioral Based Safety (BBS), a safety program brought to SRS by BNFL teaches individual responsibility for safety through behavior. It has been so successful, that it has been adopted for sitewide use.

SUMMARY

The above description of waste management activities can be summarized as moving from an era of receipt, storage and a continuing increase in a legacy inventory to an era of continuing receipts but also of treatment and disposal involving new facilities. For the first time in the history of the site the volumes of waste at SRS awaiting disposal have been and continue to be reduced. While this has represented a significant increase in scope, the costs of achieving this scope have at the same time been reduced by some 25%. This in turn is a clear manifestation of the benefits of the commercial approach of the DOE-SR contractual requirements and the successful establishment of a genuine and effective partnership between DOE-SR and its contractor.

While the future will continue to present uncertainties and challenges, a clear underlying theme will continue, i.e. the need to meet DOE objectives, both cost effectively and safely; our experience at SRS provides one model of how this can be achieved to the benefit of the customer, contractor and the U.S. taxpayer.