PROGRESS AND ISSUES IN FUSRAP AND SFMP

James J. Fiore, Director
Division of Facility and Site Decommissioning Projects
U.S. Department of Energy
Washington, D.C. 20545
and
Peter J. Gross, Director
Technical Services Division
Oak Ridge Operations Office
U.S. Department of Energy
Oak Ridge, TN 37830

ABSTRACT

The Formerly Utilized Sites Remedial Action Program (FUSRAP) and the Surplus Facilities Management Program (SFMP) have made steady progress in cleaning up facilities and sites across the United States. Over the past year, the FUSRAP completed remediation of sites in Illinois, New Jersey, and New York. At many other sites, work continued on characterizing the contamination to enable remedial action plans, environmental compliance documentation, and designs to be developed. For SFMP, the Shippingport project continued to be a model of cost and schedule management with preparation of the Reactor Pressure Vessel for transport to the Hanford Reservation for disposal. On the Weldon Spring Project in Missouri, interim remedial actions were started to address immediate environmental concerns while site characterization continued. DOE also made steady progress on smaller projects such as the Mound project in Ohio and the Experimental Boiling Water Reactor in Illinois. As with any program involving the management of radioactive waste, issues and problems arise which require resolution to permit progress. For FUSRAP and SFMP, some of the current issues are locating disposal sites for wastes, meeting environmental compliance requirements, managing risks and uncertainties, negotiating tripartite agreements, and advanced planning for the potential of mixed waste disposal.

INTRODUCTION

Based on DOE experience with the FUSRAP and SFMP projects, waste Disposal costs often can account for about one-third of total project costs. In addition, for many of the larger projects, the waste volumes are so large that removal of the waste to existing DOE disposal facilities is impractical. It is very important, therefore, to give serious consideration to those issues, both technical and programmatic, which can adversely impact waste type and volume and disposal costs. Some of the current pressing issues facing DOE on the FUSRAP and SFMP projects are disposal cell siting, agreement with EPA and state and local authorities, meeting the diverse requirements of the various environmental regulations, the impact of mixed hazardous and radioactive wastes, and planning for risks and uncertainties.

PROGRAM PROGRESS

FUSRAP

FUSRAP is one of several U. S. Department of Energy programs to remedy unnacceptable radiological conditions at a number of sites. FUSRAP is specifically directed to privately owned sites formerly used in support of the early nuclear activities of the Manhattan Engineer District or the Atomic Energy Commission. Also included are some sites specifically assigned to DOE by Congress. Some of these sites were cleaned in the past under standards in effect at that time; however, they do not meet today's more stringent standards.

Many of these sites are located in heavily populated urban and suburban areas, and are surrounded by private residences and industries which also became contaminated by the activities at the main site. Since its inception in 1974, FUSRAP has made excellent progress in identifying and cleaning the vacinity properties. Of the 290 vicinity properties identified to date, 161 have been remediated and planning is in progress for others.

In 1988 significant milestones were completed at three sites; a National Guard Armory in Chicago, the Wayne site in New Jersey, and the Colonie site near Albany, New York. In addition to these cleanup activities, a large amount of characterization was performed to prepare for remedial action at other sites.

Remedial action was completed at the National Guard Armory, where portions of the facility had been radioactively contaminated by early Manhattan Project activities. Remedial action involved removing surface contamination from floors, walls, and ceilings, and removing contaminated sludges from sumps.

Cleanup of all contaminated vicinity properties was completed at the Wayne, New Jersey site. Thorium contamination from a former W. R. Grace plant had contaminated a municipal recreation field, a school bus maintenance facility, about a half-mile of a brook, about a dozen properties along the brook, and the estuary where the brook enters a river. Contamination has now been removed from all these properties, and the material has been placed in interim storage at the former W. R. Grace plant, now owned by DOE.

At the Colonie site, airborne uranium emissions from a former NL Industries plant had contaminated 55 residential, commercial, and industrial properties. The last phase of a three-phased cleanup program was completed in 1988 with the remediation of 18 properties. In addition, a significant effort has been completed to stabilize, neutralize, and dispose of chemicals stored in the inactive

plant. Contaminated material from the vicinity property cleanup has been placed in interim storage in the plant building, which is now owned by DOE. The Remedial Investigation/Feasibility Study (RI/FS) process was started in 1988 to identify the extent of contamination on the plant property and evaluate alternatives for final cleanup of the 12-acre site.

SFMP

The SFMP was initiated in 1977 to decontaminate and decommission those retired facilities used primarily for civilian nuclear power development. To date, the SFMP inventory includes 41 projects at 15 different locations. Of the 41 projects, 11 have been completed, 20 are currently in various stages of activity ranging from planning to remedial action, and 10 are being maintained in safe conditions awaiting program funding. The objectives of the SFMP are to decontaminate these facilities and to eliminate any potential hazard to the public health and the environment. SFMP facilities include power and research reactors, fuel reprocessing plants, laboratories, storage tanks, waste treatment systems, solid waste disposal facilities, ponds, ditches, and areas contaminated by uranium and thorium from mill tailings.

Among the more significant SFMP accomplishments in 1988 was the preparation of the Shippingport Reactor Pressure Vessel/Neutron Shield Tank (RPV/NST) assembly for disposal. The vessel and tank were filled with grout for both mechanical stability and shielding and a lifting skirt was welded to the assembly. The completed assembly is being certified as a Type B package. The assembly was lifted out of containment and placed on a transporter in December and will be barge shipped to Hanford, Washington starting in late February, 1989. The Shippingport project continued to be a model of cost and schedule management as progress is made toward a planned completion in 1990.

At the Weldon Spring Site in Missouri, interim remedial actions were started to address the immediate environmental concerns. In parallel, site characterization continued to gather the information necessary for the ultimate decision on waste management at the site.

For the Monticello, Utah, millsite and vicinity properties, the DOE, the EPA, and the State of Utah signed a Federal Facilities Agreement (FFA) after more than a year of detailed negotiations. The FFA establishes the regulatory and administrative framework within which the project will be completed.

Progress continued to be made on several smaller, but equally important SFMP projects. In particular, decommissioning of the Experimental Boiling Water Reactor at Argonne National Lab made substantial progress on removal of plant systems and planning for reactor vessel removal. Decommissioning of the Triga reactor at the Center for Energy and Environment Research in Puerto Rico was completed. Also, decontamination activities continued at Mound Laboratories in Ohio.

PROGRAM ISSUES

Disposal Cell Siting

At FUSRAP sites with only a small quantity of contamination, it is possible to dispose of material at an existing DOE facility. However, in four states the volume of FUSRAP waste that may require excavation and disposal is sufficiently large that transportation to and disposal at an existing DOE site is not expected to be the preferred alternative because of the large volume of material, the distances involved and the associated high cost and increased accident risk associated with long-distance transportation. These states with large volumes of waste are Maryland (36,000 cubic yards), Missouri (692,000 cubic yards), New Jersey (531,000 cubic yards), and New York (205,000 cubic yards).

For these locations, DOE is evaluating a range of disposal options in accordance with the requirements of NEPA and CERCLA/SARA. While specific options for each site are developed during the environmental review process, generally the options include in-situ stabilization, disposal at a DOE facility to be developed nearby, and disposal at an existing DOE facility. Review of the option to develop a new facility requires evaluating both in-state and out-of-state locations. Techniques for treatment and volume reduction prior to disposal are also being studied.

While individual states or groups of states (*Compacts*) are developing low-level radioactive waste disposal facilities, DOE is not currently considering the use of these facilities for FUSRAP wastes. Under the provisions of the Low Level Radioactive Waste Policy Act of 1980, amended in 1985, FUSRAP waste can only be disposed of at a state or compact site if specifically accepted by the state subject to the provisions of its compact. As a result, DOE is working closely with the affected states to identify permanent disposal sites.

In New Jersey, DOE has formally requested that the state join in a cooperative effort; however, no agreement has yet been reached. In Missouri, Congress directed DOE to reacquire the St. Louis Airport site for use as a disposal site, in a manner acceptable to the City of St. Louis. However, the City, which owns the land, has declined to agree to transfer the property. DOE has kept appropriate Congressional staff informed of the status in St. Louis, and further Congressional direction is possible. In New York, DOE is providing the state with periodic progress reports, and the state has commented on DOE's environmental review process. DOE has initiated discussions with the state to determine if a bi-lateral agreement is mutually beneficial. When disposal siting efforts begin in Maryland, an arrangement with that state will be established.

The majority of the SFMP projects are located on government reservations and will generate small enough quantities of waste to allow disposal at the appropriate DOE waste management facilities. There are two notable

exceptions, however; the Monticello, Utah, project and the Weldon Spring, Missouri project.

The final remedial action for the uranium mill tailings of the Monticello Remedial Action Project remains an open question. Because of the volume and nature of the wastes, the viable options are limited to either on-site or near-by off-site stabilization. In addition to mill tailings at the mill site, the wastes being generated by remediation of the vicinity properties are being stored temporarily at the mill site. Two of the options currently under consideration would involve "on-site" disposal. At the Weldon Spring Project, DOE has been working closely with the EPA and the State to develop the appropriate environmental documents to permit a decision on final disposal.

Tri-Partite Agreements

Three of the 31 FUSRAP sites are on the National Priorities List. For sites that are listed on the NPL, DOE will negotiate three-party agreements among DOE, the EPA, and the state. These agreements will identify the responsibilities of each party and the schedule for environmental compliance. Such agreements are currently being developed with EPA Region II and the State of New Jersey for the Wayne and Maywood sites.

For FUSRAP sites that are not on the NPL, DOE coordinates closely with EPA and the affected state to ensure that they are fully informed of DOE's planned approach to remedial action. DOE will negotiate two-party agreements with the affected state when such as agreement is deemed to be of mutual benefit.

In December of 1988, the SFMP concluded a prolonged negotiation of a Federal Facilities Agreement under CERCLA Section 120 for the Monticello Remedial Action Project in Monticello, Utah. The Agreement, signed by the DOE, the U.S. Environmental Protection Agency (EPA), and the State of Utah, establishes the responsibilities and the process for the cleanup of uranium mill tailings located on the DOE-owned millsite and on other properties nearby (vicinity properties). The vicinity properties, as a group, were placed on the National Priorities List (NRL) in 1986, and the millsite was proposed for inclusion on the list in 1988.

The Monticello Agreement is one of the first Federal Facility Agreements to be signed by the DOE (a two party agreement with EPA for Weldon Spring Site was signed in 1986 and the Lawrence Livermore Agreement was signed in 1988). It was the result of more than a year's negotiation effort. Two of the most significant and difficult issues to resolve were the definition of the State of Utah's role in the process and the questions of DOE's reimbursement of costs to the State of Utah and the EPA. In the final language of the Agreement, the State will play an active role in the review of DOE's activities and documents, and will become a party to the Record of Decision for the project. Relative to cost reimbursement, the DOE has agreed to provide a grant to the State of Utah to cover the State's review costs; however, the question of DOE reimbursement of EPA costs was not addressed in the Agreement and remains as the final point to be negotiated by the two agencies.

Integration of the CERCLA and NEPA Processes

It is DOE's policy to satisfy the requirements of NEPA and CERCLA with a single, integrated set of documentation. The primary instrument for DOE's integrated NEPA/CERCLA process will be the RI/FS process. The RI/FS process will be supplemented, as needed, to meet the procedural and documentation requirements of NEPA. Thus, the integrated document essentially will be an RI/FS with the additional information as required to satisfy the requirements of NEPA.

The scheduling of the RI/FS documentation development is critical to total project planning. One estimate of the time required to obtain a Record of Decision (ROD) for an integrated RI/FS document is seven and one half years. Although this time period may be shortened through innovative implementation of remedial action plans, it underscores the importance of factoring RI/FS document review early in the project planning stage.

For sites not on the NPL, FUSRAP also is implementing a process for integrating the EIS requirements of NEPA with the RI/FS requirements of CERCLA/SARA. The environmental review process, using this integrated approach, was started during 1988 for three sites in Tonawanda, New York, and for the Colonie site.

As part of the integrated NEPA/CERCLA process a community relations plan is developed for the applicable FUSRAP and SFMP sites. Until recently, most activity was focused on cleaning up contaminated sites and vicinity properties. With the increasing emphasis on development of permanent disposal sites to accomodate waste volumes resulting from remedial actions, the need for broader community relations programs has become evident. The process of identifying permanent disposal sites understandably results in a greater degree of concern on the part of citizens and public officials.

Mixed Waste

The disposal of mixed waste (i.e, radiologically contaminated hazardous waste) presents both technical challenges and severe economic penalties. Therefore it is paramount that waste be properly characterized. That is, mixed waste must be subjected to two separate and distinct tests.

First, the radiological contamination must be higher than the appropriate unrestricted release limits. This generally is a straight forward determination based on NRC Reg. Guide 1.86 and 10 CFR Part 20. For SFMP and FUSRAP the requirements of Reg. Guide 1.86 are implemented by specific guidance (Ref. 1) which also specifies the use of ALARA principles to further reduce potential radiation exposures.

Second, the waste must be determined by the generator to be hazardous in accordance with the RCRA regulations of 40 CFR Part 261. Determination of whether a waste is hazardous is basically a two step process. *Generators* are first required to determine if their wastes meet the listing

descriptions found in 40 CFR Part 261, Subpart D. Waste found to meet the listed descriptions exactly, including how it was generated, is considered listed hazardous waste. Incorrect determinations of hazardous waste may occur when the generator finds one or more of the constituents listed in Appendix VIII of Part 261 in a waste stream. Appendix VIII constituents are solely for EPA's use in deciding whether a waste should be regulatorily listed as hazardous waste. Their mere presence in a waste stream does not render that waste hazardous.

If a waste does not meet the listing description, it is then subjected to a series of tests to determine if it meets any of the hazardous characteristics defined in 40 CFR Part 261, Subpart C, of the RCRA regulations (i.e. ignitability, reactivity, corrosivity, or extraction procedure toxicity). Meeting any one of the characteristics definitions causes the waste to be classified as hazardous.

In the event that a hazardous constituent in radioactively contaminated waste is determined to meet the characteristics of 40 CFR Part 261, Subpart C or D, the only disposal option available to DOE at present is to ship the mixed waste to the Idaho National Engineering Laboratory for interim storage pending development of a permanent facility. (Interestingly, the Governor of Idaho has issued an embargo on shipping of any radioactive waste into Idaho until the WIPP facility is operational.)

An alternative to indefinite storage of mixed waste is to treat the waste to result in either a non-hazardous or non-radioactive product which can be disposed of. In one case, this was achieved by the FUSRAP project at the National Guard Armory in Chicago.

Of the 48 drums of waste generated by the remedial action, 32 drums of radioactively contaminated material were shipped to the DOE Hanford reservation for disposal in 1987. However, sixteen drums of sludge were left in storage at the armory because it was determined to be mixed waste due to the RCRA characteristic of ignitability.

In 1988, the sludge was treated with a double heating technique to drive off the volatile organics and was mixed with diatomaceous earth to reduce moisture content and further stabilize the waste. Post-treatment tests have shown that the material no longer qualifies as mixed waste.

Relative to the development of a new permanent disposal cell for mixed waste, the apparently conflicting requirements for disposal of hazardous waste and for disposal of radioactive waste must be addressed. The hazardous waste disposal cell designs include active monitoring systems with leachate collection systems, man made materials, and relatively short design lives.

Radioactive waste disposal designs utilize natural materials to achieve a design life of up to 1000 years. Specific unresolved questions are what happens in several hundred years to the leachate collection systems and what happens to the overall integrity of the cell.

Risks and Uncertainties

In order to deal with the risks and uncertainties potentially affecting the program's costs, a cost risk assessment was performed for the FUSRAP program. This assessment screened areas of major potential risk and applied a probability of occurrence to each risk area. Areas evaluated were: addition of new sites to the program; changes in radiation exposure standards, impact of mixed waste issues, impact of CERCLA/SARA, possible program delays, problems with disposal siting, volume changes, and groundwater resoration.

The probability of a particular risk element occurring was evaluated and characterized as low, moderate, or high based on technical factors, trends and project experience. The overall cost risk to the project was determined by first identifying specific risk elements under each of the risk areas. The "total cost" for each of these elements was then estimated and multiplied by the probability of its occurrence. The resulting probabilistic cost estimates for all risk elements, labeled "cost risk", were summed to determine the overall cost risk to FUSRAP. The resulting total program cost risk was determined to be a 43% increase to the baseline cost, which is judged to be reasonable considering the current status of the project.

Although it is unreasonable to expect all of these potential risks to occur, it is a virtual certainty that some will occur. The probabilistic assessment approach accounts for this so that the total cost risk estimate for the program is judged to be reasonable.

As with other environmental restoration projects, experience on FUSRAP has shown that plans and schedules are not dictated by technical issues alone; they can be significantly altered by state and EPA actions, citizen intervention, and changing budget priorities. To adapt to this uncertainty, FUSRAP now develops several optional plans for each year, in addition to the baseline plan. This provides flexibility to shift resources from one site to another if work at a site is delayed by factors beyond DOE's control. One of the techniques used is to identify "opportunity sites." These are locations with a relatively small amount of contamination and an available disposal option. If work at a larger site is delayed, funds can be shifted to the "opportunity sites" so the program can continue making progress.

Uncertainty with identifying and agreeing on the applicable regulations is an important consideration. The EPA is currently in the process of developing ground-water standards for uranium tailings disposal sites, for inclusion in 40 CFR Part 192. Although the regulation is intended for sites under the authority of the Uranium Mill Tailings Radiation Control Act (which the Monticello site is not), the regulation will apply as a relevant and appropriate requirement under CERCLA. The proposed standards would set maximum concentration limits on contaminants in the ground water beneath the tailings (the rule currently has no ground-water provisions). Then standards, when implemented, may require conceptual design modification and a revised evaluation of alternatives for disposal as

proposed in the RI/FS. The final standards are not expected to be issued until later 1989.

SUMMARY

Management of the FUSRAP and the SFMP involves a variety of regulatory, technical, and socioeconomic issues. The siting of new radioactive waste disposal sites is an important and difficult issue for remedial action projects where the volumes of waste are large and no existing disposal sites are near. The involvement of affected states and the concerned public is a critical factor in the process. Formal agreements between the DOE, States and the EPA have been and are being developed to define mutually acceptable processes for proceding wiht remediation and waste disposal. These agreements are a difficult but important part of both programs. The DOE is working toward making the regulatory compliance process more efficient through the integration of the NEPA and CERCLA processes and associated documentation. There are significant cost and schedule savings to be gained by making these two processes into one. Mixed waste disposal presents a special problem for the SFMP and the FUSRAP because of the unavailability of DOE disposal sites. Careful identification of the wastes and treatment to "declassify" the material as mixed waste are two important considerations for this issue. These and other technical and regulatory issues pose significant uncertainties, with associated risks, for the remedial action projects of the FUSRAP and the SFMP. DOE management of these two programs incorporates these uncertainties and risks to the extent that they are currently understood. DOE is continuing to make significant progress in remediating the FUSRAP and SFMP sites and facilities and managing the resulting wastes.