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The Mixed Waste Focus Area: Status & Accomplishments

INTRODUCTION

The Department of Energy (DOE) established the Mixed Waste Characterization, Treatment, and Disposal Focus Area (MWFA) to develop and facilitate implementation of technologies needed to meet the Department's commitments for the treatment of mixed low-level and transuranic wastes. The Idaho National Engineering Laboratory (INEL) has been identified as the Lead Organization for the technical management of the Mixed Waste Focus Area. A DOE Idaho Operations Office manager has overall responsibility for the performance and accountability of all organization elements. Lockheed Martin Idaho Technologies is accountable to DOE-ID for the performance of each functional element. To successfully carry out the DOE's planned approach, the Mixed Waste Focus Area uses capabilities, expertise, and resources from across the DOE Complex.

The Mixed Waste Focus Area began operations in February of 1995. Its mission is to provide acceptable technologies that enable implementation of mixed waste treatment systems developed in partnership with end-users, stakeholders, tribal governments, and regulators. The MWFA will develop, demonstrate, and deliver implementable technologies for treatment of mixed waste within the DOE complex. Treatment refers to all post waste-generation activities including sampling and analysis, characterization, storage, processing, packaging, transportation, and disposal. The MWFA's mission arises from the Resources Conservation and Recovery Act (RCRA) as amended by the Federal Facility Compliance Act (FFCA) . Each DOE site facility that generates or stores mixed waste prepared a plan, the Site Treatment Plan, for developing treatment capacities and treating that waste. Agreements for each site were concluded with state regulators, resulting in Consent Orders (COs) providing enforceable milestones for achieving treatment of the waste.

The Mixed Waste Focus Area is a requirements driven program based on systems engineered processes designed to meet the sponsor's (EM-50) and customers' (EM-30, -40, and -60) needs. The requirements flow from the Site Treatment Plans that were prepared in response to the FFCA. Product schedules are tied to Consent Order

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schedules which have been issued for the implementation of the treatment schedules detailed in the Site Treatment Plans.

SYSTEMS ENGINEERING PROCESS

The Mixed Waste Focus Area Proposal contains the set of commitments that drive the focus area. Briefly stated these requirements are: The Mixed Waste Focus Area shall deliver sufficient implementable technologies that are correct, complete, acceptable, sponsored, permittable, safe, cost-effective, and timely such that end-users have sufficient treatment systems to treat essentially all of the DOE Complex's mixed low-level and transuranic wastes.

The proposal's commitments included the promise of a systems engineering approach to identify, prioritize, and solve mixed waste problems. The commitment was also made to effect three pilot-scale demonstrations in FY-97 which are potentially capable of treating at least 90% of the complex's mixed waste. These commitments form the initial description of what the MWFA program was funded to produce. The Program Management Plan (PMP) and the Systems Engineering Managment Plan (SEMP) provides the detailed top-level system description and identifies the requirements of the final deliverable product, i.e., implementable technologies.

STRATEGY

Analysis of MWFA Documents and two higher level DOE strategy documents, the Environmental Management Strategic Plan and the EM Action Plan identify seven elements of a strategy which has been used to structure the MWFA Program.

1. Use a systems engineering approach,

2. Assure technical integration and implementation through Waste Type Managers,

3. Achieve program integration with a central program staff,

4. Prioritize all technology development and demonstration,

5. Assure an end-user for all technology developed or demonstrated,

6. Base technology needs on FFCA Site Treatment Plans, and,

7. Team with stakeholders, industry, and universities.

The Mixed Waste Focus Area has been organized and is operating. Waste Type Managers, located within the EM organizations that own the wastes and representing sites with the major mixed waste inventories and/or problems have been given the charter to provide primary direction to the technology development

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and demonstration tasks. This arrangement maximizes the tie between technology developers and end-users. The Waste Type Managers are supported in their efforts by five resource groups composed of professional, scientific, and engineering staff with a mix of skills including waste technology, mechanical and chemical engineering, regulatory, legal and public affairs. Systems engineering methods have played an important part in the preparation of the initial documents and planning processes. A technical baseline has been developed and forms the basis of the Fiscal Year 1997 budget submittal.

The Mixed Waste Focus Area has met its commitments to assure that teaming arrangements are considered and employed whenever possible. The program has a strong and active Regulatory and External Liaison Unit. This unit is dedicated to ensuring industry, university, and tribal and public stakeholder participation, input, and acceptance. The regulatory element's role includes the identification of regulatory requirements for technology development activities and the coordination of efforts to effect multi-state participation in the acceptance of demonstration protocols. The stakeholder element has established and begun implementation of an effective strategy for involving public and tribal stakeholder groups. The strategy is three tiered; 1) the Community Leaders Network provides input to management activities, 2) the Technology Requirements Working Group provides input to the Technology Development Requirements Documents (TDRDs), and 3) site specific stakeholders provide site specific information.

To maintain control of complex projects the MWFA employs a Development Plan (DP) to allocate the technical tasks and to schedule major milestones in multi-year technology development efforts. Even for less complicated projects, a DP will be prepared to schedule major milestones, including transition stages as described in the Technology Development Guidance Document.

DPs are prepared based on the TDRDs and supporting studies and analyses. The DP describes the integrated life-cycle planning for a specific technology development and provides a mechanism for the MWFA to manage a portfolio of technology options. The DP contains descriptions of development: activities, performers, schedules, transition, success criteria, and life-cycle cost. This provides integration of the activities of multiple contributors over several funding cycles.

STATUS

The complex task of overcoming the "technology deficiencies" standing in the way of completing the waste treatment systems capable of treating the DOE's waste has been reduced to three simple ideas. What, when, and how. The "what" part of the task was determining what technologies were needed by the focus area's "customers" in environmental restoration and waste management who currently generate, store, and manage the waste. The Waste Type Managers (WTMs)and other technical elements of the focus area have prioritized the treatment trains and deficiencies which provide the basis for the program's technology development

activities. Studies conducted to identify or analyze needs are issued in program documents. Examples of such needs studies and reports include the DOE Complex Needs Report, the Waste Characterization Report, the Waste Initiative Program Plan, and the Continuous Emissions Monitor Strategy.

The goal of the Focus Area's strategy is to continuously target the highest priority customer needs. The MWFA's Integrated master Schedule (IMS) is a list of treatment systems identified in the Site Treatment Plans and Consent Orders, with identified technology needs and associated schedules. The IMS is designed to ensure that all technology development activities meet customer needs and that technology development schedules are completed in time for use in treatment systems. The IMS is continually updated as improved data becomes available and as site representatives provide new information. The MWFA is the first EM-50 program to implement Technology Development Requirements Documents (TDRDs) into the technology development process. TDRDs are being written for the eighteen projects being funded in FY-97. The TDRDs provide a clear description of the work to be done in verifiable requirements so projects can be tracked throughout the life of the project to ensure they will meet customer needs and can be implemented successfully. TDRDs include technical, regulatory, and stakeholder issues. TDRDs are part of DOE's "performance-based contracting."

The "when" translates into determining when the customers need the technologies to meet deadlines set forth in Site Treatment Plans and Consent Orders in force at DOE sites in 22 states. To determine "how" the technologies will progress from concept to implementation, the focus area uses a "product development" model. Called the Technology Development Transition Guidance, the document spells out what criteria must be met in each phase of a technology's development and demonstration. Defining criteria must meet strict environmental safety and health requirements, stakeholder and tribal requirements and obtain co-funding from a DOE customer or commercial partner in the final development phase of the project.

ACCOMPLISHMENTS & GOALS

For Fiscal Year 1996 the Mixed Waste Focus Area has achieved a high degree of program integration and technical defensibility by creating a sound, integrated infrastructure and by implementing system engineering practices. The MWFA completed implementation of the Waste Type Team (WTT) that supports the Waste Type managers in identifying the technology deficiencies and in determining which technology development projects should be funded. The WTT includes technical, regulatory, systems engineering, and public and tribal interface support, as well as Site Operations Contacts that provide a key link to the end-users at the various DOE facilities.

An Integrated Program Schedule has been developed and kept current. This tool aids in integrating the input of each MWFA element (technical, regulatory, and stakeholder) for major deliverables. Technical defensibility has been strengthened

by defining the requirements for the technology deficiencies in Technology Development Requirements Documents (TDRDs). Draft guidance on how projects transition through the various stages of technology development, and to the end-user, has been completed. An aggressive quick-wins program has been initiated involving nineteen projects valued at $2,700,000 addressing approximately 100 cubic meters of waste and 25 waste streams. "Quick-win" activities are planned to continue through treatability studies with end-users. In addition, top level strategies have been put in place to integrate the major technology development areas, including a melter strategy and a characterization strategy.

Systems engineering processes have been effectively used by the MWFA to solve mixed waste problems. The thirty prioritized deficiencies from the MWFA Technical Baseline were matched to planned mixed waste treatment systems across the DOE Complex in the Integrated Master Schedule. This allowed the MWFA to identify the technology development "window of opportunity" for each deficiency. Requirements for the technology deficiencies have been defined in the TDRDs. These TDRDs document the technical, regulatory, and public and tribal requirements and tie them back to the end-users. Using a Request for Expression of Interest (RFI), the MWFA determined and documented the status and maturity of technologies available in the DOE laboratories, universities, and in the private sector that could address the MWFA deficiencies. Based on the RFI results, the MWFA initiated separate procurement actions in the private sector and within the DOE laboratory system. The MWFA uses the RFI/RFP process to ensure the best capabilities of industry, universities, and laboratories address mixed waste technical deficiencies.

Contributing to ensuring that effective use is made of input to the focus area is an Information Management System that has been implemented within the MWFA that integrates the total communication process. This system is comprised of a Communication Information Management System that executes the document management activities of indexing, controlling, and distributing documents. The information system also addresses electronic information presentation, distribution, and management using the Internet.

Building on our FY-96 successes, planned activities for FY-97 include:

1. The focus area will complete an evaluation of the DOE Complex's mixed waste technology development needs and begin to proactively plan for the orderly close-out of the program. Prior to closure the MWFA will enable treatment of at least 90% of the Complex's mixed waste, one of the major milestones for the program. The continuation of activities begun in FY-96 are projected to culminate in FY-97 in the successful development of three technologies capable of meeting the 90% goal. Three technologies nearing the successful completion of their development and demonstration phases that could treat 90% of DOE's mixed wastes are:
    a. The Plasma Hearth Process (PHP)
    b. Joule Heated Vitrification

c. Polymer Macroencapsulation

2. The MWFA Integrated Technical Baseline Report documents a prioritized, defensible technical baseline which has served as the basis for a Request for Information (RFI)/ Request for Proposals (RFP). The MWFA Integrated Technical Baseline Report will be updated based on a comprehensive Complex-wide survey of EM-30/40/60 needs and deficiency prioritization process and include technology development conducted by other focus areas/cross-cut programs. The Integrated Master Schedule will also be updated based on the most recent Site Treatment Plan, Record of Decision, and/or Consent Order Data. The MWFA will conduct an early assessment of activity and/or schedule changes that occur upon site implementation of the DOE Ten Year Plan.

3. Prepare, publish, and control an integrated set of requirements in the Technology Development Requirements Documents (TDRDs) for each technology development project. Document compliance with the TDRDs in Technology Performance Reports for use by EM-30/40/60 in performance based contracts.

4. Development Plans (DPs) which ties together related deficiencies into groups. The DPs are management tools the WTMs use to control scope, cost, and schedule of the TD efforts for the groups of deficiencies.

5. Address high priority technical deficiencies critical to customer needs through technology demonstrations on actual wastes.

6. Use the regulatory resource to engage regulators early in the TD process to gain their participation in defining requirements and strategies. Within the TD process take steps to increase the commercialization potential of MWFA technologies. Maintain interaction with regulatory agencies, public and tribal stakeholders groups in order to continue development of functional requirements for Technology Performance Reports. Utilize the external affairs resource to ensure that interested and affected tribes and members of the public are informed of, and have opportunities for input to, MWFA management, technical baseline and site-specific activities and decisions.