FUSRAP - A PROGRAM OF PROGRESS

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ABSTRACT

Management problems are inherent on large environmental restoration projects. The Department of Energy's Formerly Utilized Sites Remedial Action Program (FUSRAP) utilizes a well documented, integrated management system to provide stability and control in a dynamic environment. This system is based on an interrelated project controls and quality assurance principles. This paper describes management system development and uses FUSRAP as a model. This system has allowed for innovation and accomplishment within a structured framework. The foundation for FUSRAP's future progress is enhanced by its proven management system.

INTRODUCTION

Large environmental restoration projects are characterized by many complexities, such as: multiple major participants (potentially responsible parties, environmental contractors, project management contractors, and field support contractors) involved in performing the work, compliance a proliferation of regulations and laws, multiple regulators monitoring the work, multiple waste area groups, multimillion dollar costs, and uncertainty of scope. These complexities place success in jeopardy for these highly visible projects. The Formerly Utilized Sites Remedial Action Program (FUSRAP) is major DOE remedial action program which has these challenging characteristics. This major environmental program was initiated in 1974 to evaluate and remedy radioactive (and sometimes chemical) contamination exceeding current guidelines at sites of early work on the nation's atomic energy program. FUSRAP activities involve 31 sites in 13 states. A sound management system is required to achieve successful progress, control activities, and provide flexibility for change and innovation.

This paper describes the FUSRAP management system, demonstrates its effectiveness through the program's accomplishments and work innovations, and discusses the future of the program. Some argue that a controlled management environment stifles creativity, limits flexibility, and creates unnecessary paperwork. If project management develops a suitable system, creativity can be encouraged, change can be accommodated, and paperwork can serve a useful purpose. A formal management system helps clarify complex projects, enables continuity for long-term projects, provides a training base for new participants, resolves organizational conflicts, defines technical performance guidelines, and serve as a basis for improvement. If the system is properly organized, it can result in a synergistic output. Systems integration, which is the essence of project management, provides the framework and interfaces for unifying disciplines, specialties, and functions in order to accomplish project goals within cost and schedule constraints.

SYSTEM MANAGEMENT PRINCIPLES

The primary criteria for developing a management system are contained in the disciplines of project controls and quality assurance. DOE Order 2250.1C, Cost and Schedule Control System (CSCS) Criteria, provides 35 criteria to address the management aspects of time and cost for a project. These criteria address: organization, planning and budgeting, accounting, analysis, and revision and access to data. ASME NQA-1, Quality Assurance Program Requirements for Nuclear Facilities, prescribes 18 basic quality assurance requirements which address performance. Although the basic requirements deal with quality assurance for nuclear facilities, the intent can be applied to any quality objectives. Because they are basic management principles, which are complimentary, the DOE criteria and ASME requirements together provide an excellent basis for developing a project management system.

The complementary relationship between project controls criteria and quality assurance requirements can be seen in the following examples. Each criteria requires that the organizational structure and functional responsibilities be documented. NQA-1 requires that the design be defined, controlled, and verified. The Work Breakdown Structure of a CSCS provides a framework to assist in the design organization. CSCS Criteria further requires that organization be integrated with the Work Breakdown Structure. Quality assurance demands plans to document HOW work is to be done, whereas project controls requires the sequence or schedule addressing WHEN the work will be accomplished. Quality assurance requires independent measurements of the effectiveness of planning, policies, procedures, methods, and training as they relate to meeting project objectives. Project controls requires performance measurement to assess the work being performed against a cost and schedule baseline. Corrective action is necessary to address conditions that are out of tolerance. Each discipline must provide documentation as tangible evidence that work was accomplished according to project objectives.

Other criteria, assurance and determining price variances for cost control, are not find common to both disciplines, but they both play an essential part in an integrated management system.

MANAGEMENT SYSTEM DEVELOPMENT

A project management system is a collection of interdependent procedures and equipment assembled and integrated to perform a the well-defined objectives of the project. It is an assembly of procedures, processes, methods, routines, or techniques used by trained, qualified people united by approved documentation that regulates interaction to form an organized team.

Actual system development will involve defining processes to accomplish the project controls and quality assurance criteria. Communication and reporting interfaces must be identified. Proper means of planning, executing work, monitoring, and reevaluating performance need to be determined in order to provide an improvement cycle for continually assessing performance. Responsibilities and accountability must be identified. As the processes of the management system are identified, flow charts can be used to design efficient steps to accomplish the intended purpose. A management system should be structured to take advantage of existing organizational accounting systems, internal auditing practices, existing training programs, technical support systems, and available computer resources. The use of complementary methods of communications between participants should be maximized. Training in procedures, policies, and methods is required. The level of complexity of the system will be proportional to the complexity of the project. However, emphasis should be placed on basic management needs, timeliness, and simplicity.

The basic life cycle of a simple project is to set objectives, plan work based on available resources, execute the work with appropriate resources, and complete the project. For a complex program such as FUSRAP, additional controls are necessary. The unique aspects of FUSRAP are multiple sites, each a project in itself; uncertainty of scope due to the nature of waste restoration projects; and the duration of the project, which spans decades. Therefore, it is sound business practice to establish a process improvement cycle for the work performed, which includes planning, work execution, monitoring, and reevaluating. This cycle of work provides control and improvement and is accomplished effectively by using a structure of approved (1) technical scope, cost, and schedule baselines; (2) standards and methods for performing work; and (3) documentation systems to provide control and access to documents that maintain tangible evidence that the work was accomplished according to established policies, procedures, and methods. Figure 1 is a conceptual model of these elements applied to the FUSRAP project management system.

System description documentation is a means to provide clear directions to the project participants, thereby allowing managers to spend more time on management issues and less of their time in providing direction on routine tasks, clarifying directives, and resolving conflicts and misunderstandings. In addition, such documentation establishes a standard of operations, without which there can be no improvement. FUSRAP uses a Management Requirements and Policies Manual (MRPM) that describes FUSRAP management systems, protocols, policies, and requirements that implement and control execution of FUSRAP actions and documents. The MRPM is also intended to define DOE's roles and responsibilities and the roles, specific responsibilities, and scope of activities that DOE has delegated to its contractors. The MRPM defines the interfaces among organizations for conducting major program activities and generating documents, and establishes their lines of communication. The MRPM represents the top tier in a project hierarchy of manuals that describe, in increasing detail, the policies, requirements, and procedures governing FUSRAP activities. The MRPM identifies the FUSRAP management control systems consistent with the requirements of Order DOE 4700.1, Project Management System, and also serves as the FUSRAP quality assurance program plan for DOE responsibilities under Order OR 5700.6B, Quality Assurance. Appended to the MRPM are several documents applicable to FUSRAP that supplement the MRPM or that contain additional policy or requirements not included in the main text. These documents include the project plan, management charter, project management control system summary, work breakdown structure dictionary, and community relations guidance document.

In addition, FUSRAP project procedures describe activities involving two or more participants. Each participant, such as the project management contractor, also maintains project instructions for activities within its organization, providing project personnel with procedural guidelines for conducting project-oriented activities. These are controlled reference documents which are revised as improvements are identified.

RESULTS: FUSRAP ACCOMPLISHMENTS

Since field work began in 1979, remedial action has been completed at 9 sites and characterization and remedial action are in progress at 14 other sites, planning and engineering are underway at 12 sites, 161 (of 290) residential and commercial vicinity properties have been remediated, and 470,000 yd^3 (of an estimated 1,700,000 yd^3) of FUSRAP wastes are in interim or permanent disposal facilities. In

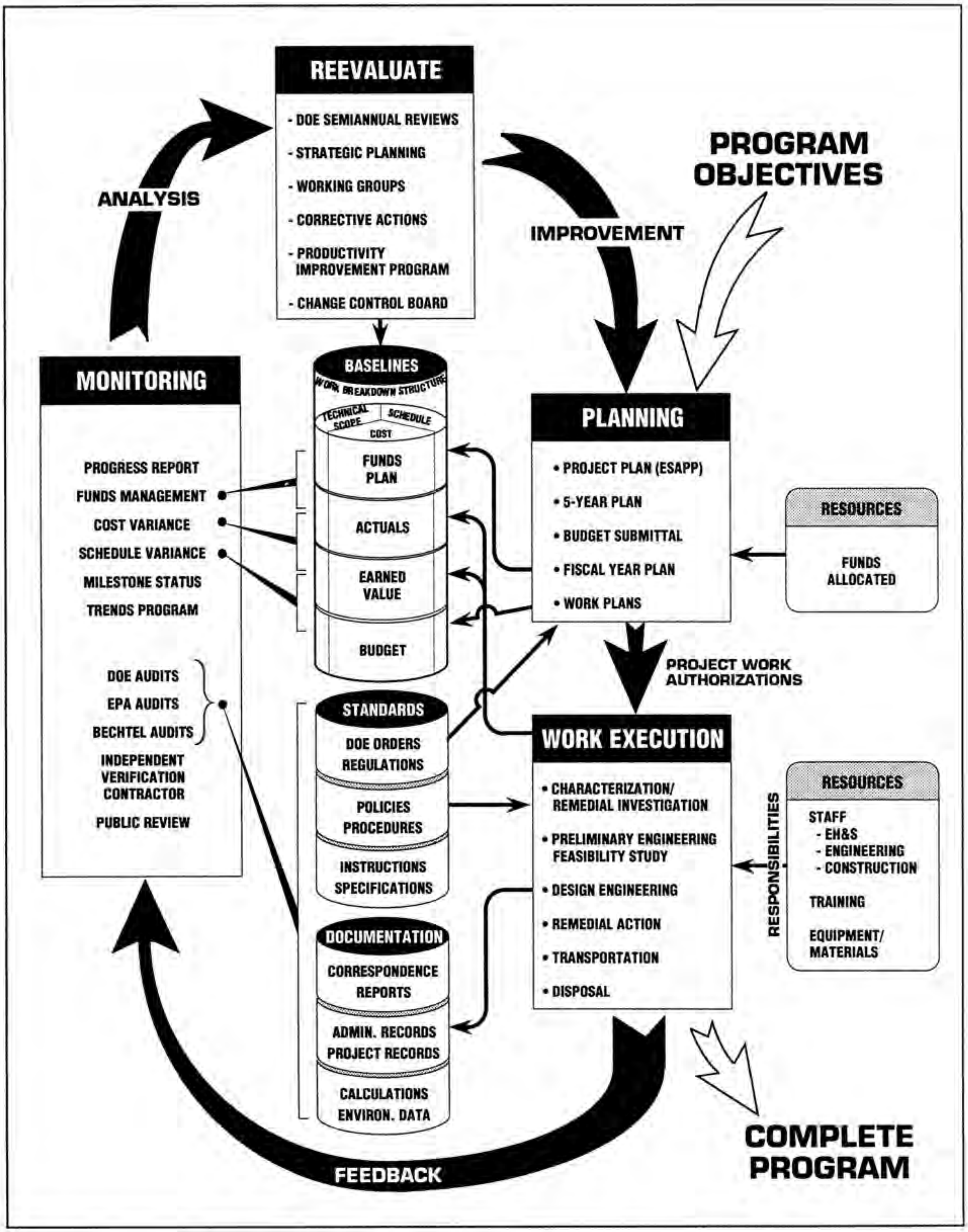

Fig. 1. FUSRAP Project Management System Model.

addition, the following innovative approaches have been developed to conduct FUSRAP work.

An iterative drilling process for characterizing of radioactively contaminated properties uses historical information to make preliminary predictions of the horizontal boundaries of contamination. When these boundaries have been estimated, perimeter sampling locations are spaced at 60-m intervals; a second set of sampling locations is placed outside the waste area perimeter at 60-m intervals parallel to and at 30-m intervals perpendicular to the perimeter. If contamination is found in samples from the outer locations, additional locations are established at 40-m intervals parallel to and outside of the questionable areas. This process continues until the horizontal boundaries of contamination are positively identified. When they are established, spacing of sampling locations can be reduced, because only depth and nature of the waste are being examined. This process focuses the sampling effort on the contamination area without unnecessarily characterizing large portions of uncontaminated property. It is estimated that this approach saved the program approximately $2 million over systematic drilling.

Another innovation, which involves newly developed instrumentation for detecting thorium-230 in the field, reduces the cost of analytical services and the turnaround time for receiving soil sample results. The photon-electron-rejecting alpha liquid scintillation (PERALS) spectrometer uses a solvent extraction analytical protocol to selectively isolate alpha-emitting radionuclides and can discriminate or reject pulses originating from beta or gamma decay. The time required for analyzing samples is reduced from an average of 45 days to approximately 4 to 5 hours. Use of the PERALS system saves 50 to 60 percent in labor costs alone, reduces characterization time, guides remedial action, and allows detection of lower minimum detectable activities.

A new treatment process for converting hazardous chemical/ radioactive mixed waste to low-specific-activity (LSA) radioactive waste was successfully employed on sludges at the Chicago National Guard Armory. Because it was classified as mixed waste, the sludge could not be accepted at any commercial or federal disposal facility. In addition to uranium in concentrations as great as 14,000 pCi/g, the sludge contained sufficient quantities of volatile and semivolatile organic compounds to cause it to display a Resource Conservation and Recovery Act (RCRA) hazardous waste characteristic of ignitability. A two-phased thermal treatment process substantially reduced these concentrations and thus eliminated the ignitability characteristic; disposal of the sludge as radioactive LSA waste was approved in February 1989.

Pre-remedial action characterization activities at the University of Chicago George Herbert Jones Chemical Laboratory, indicated that asbestos-containing material (ACM) and/or perchloric and picric acid salts could be present. Before remedial action by decontamination or removal, field tests were performed on the duct system to determine whether the acid salts (which are explosive and can be detonated by shock, impact, heat, or friction) were present. The ducts were steam-cleaned to remove the acid salts, and the ACM was removed to protect the workers.

DOE has been planning and implementing FUSRAP activities since 1974, first under the jurisdiction of the National Environmental Policy Act (NEPA) and then under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The Superfund Amendment and Reauthorization Act (SARA) established additional procedural requirements for FUSRAP, and the CERCLA/NEPA process was developed as an integrated approach for meeting the requirements of both. After evaluation of several alternatives, the integrated approach [preparation of CERCLA and NEPA documentation; that is, remedial investigation/feasibility study-environmental impact statement (RI/FS-EIS) and engineering evaluation/cost analysis (EE/CA) reports having sufficient environmental assessments] was selected. This approach prescribes a single record of decision for remedial action for both DOE and the Environmental Protection Agency (EPA). The approach consists of three phases: scoping/ planning (for task definition, field activities, and documentation), remedial investigation or site characterization, and RI/FS-EIS or EE/CA. Three options for implementing the integrated approach were identified: (1) full-scope approach, integrating NEPA and CERCLA requirements with EPA concurrence; (2) full-scope approach without EPA concurrence; and (3) abridged approach (former NEPA process) expanded to address CERCLA concerns (such as chemical characterization) in addition to the standard radiological characterization plan. These three viable options satisfy the intent of both CERCLA and NEPA and can be selectively applied as appropriate.

These are examples of how FUSRAP has been able to implement new technologies, adjust to unique field characteristics, and accommodate a dynamic regulatory environment. From this stability, a program to emphasize improvement can function and be effective.

CONTINUOUS PROCESS IMPROVEMENT

Once a management system and its individual processes are defined, the foundation is laid for improvement. Project success requires the *commitment* of its people. People become committed to a system when they understand it and are a part of its development or improvement. If management is dedicated to improving the way work is done, they will establish working groups and allow the people performing the work to analyze the processes of the management system and make recommendations for improvement. This participatory problem-solving program requires objective analysis based on statistics and uses logic and discipline to accomplish its goals. An established improvement program forces the review of interrelationships and processes. Accepting recommendations from the working groups will (1) improve the work, (2) afford skill development for the people, (3) remove hassles or roadblocks, (4) provide a stimulating and interesting work environment, and (5) provide recognition of those involved in the work. This commitment to ongoing improvement by everyone is an integral part of the FUSRAP management system.

FUTURE OF THE PROGRAM

FUSRAP is entering what is perhaps its most difficult phase. Emphasis is now focused on the processes necessary for selecting and developing permanent waste disposal facilities. The total estimated volume of material requiring disposal is about 1.5 million cubic yards, most of which is in four states: New Jersey, New York, Missouri, and Maryland. However, the chances of future successes are enhanced because FUSRAP is a mature project with established disciplined management.

Admiral James D. Watkins, Secretary of the Department of Energy, has established an Environmental Restoration Five Year Plan to focus on the department's needs for waste management. FUSRAP sites, which are located in commercial and residential areas across the country, have been assigned priority I and II status for continued remedial action in this plan. In a time of increased public attention on DOE contamination cleanup, FUSRAP represents a program of progress.