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RISK MANAGEMENT WITHIN EASTERN AREA PROGRAMS

Evaluation Report

Prepared for
The U.S. Department of Energy
The Office of Eastern Area Programs, EM-42

Prepared by
The Oak Ridge National Laboratory
Center for Risk Management

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CONTENTS

ACRONYMS

A&E	Architectural and Engineering Firm
ADS	Activity Data Sheet
ARAR	Applicable or Relevant and Appropriate Requirement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CRM	Center for Risk Management
CRU	CERCLA/RCRA Units
D&D	Decontamination and Decommissioning
DOE	United States Department of Energy
DMP	Data Management Plan
DQO	Data Quality Objective
DQP	Data Quality Program
EAP	Eastern Area Programs
EGG	Environmental Geochemistry Group
EMDMP	Environmental Measurements and Data Management Plan
EPA	United States Environmental Protection Agency
ER	Environmental Restoration
ERBAM	Environmental Restoration Benefit Assessment Matrix
ERD	Environmental Restoration Department
FACTS	Fernald Analytical Computerized Tracking System
FEMP	Fernald Environmental Management Project
FERMCO	Fluor Daniel Environmental Restoration and Management Company
FFA	Federal Facilities Agreement
GIS	Geographical Information System
GIMS	Geochemical Information Management System
HRS	Hazard Ranking System
IRMS	Integrated Risk Management System
LOC	Local Oversight Committee
MCIS	Management Control Information System
MMES	Martin Marietta Energy Systems, Inc.
NPL	National Priorities List
NRC	Nuclear Regulatory Commission
OREIS	Oak Ridge Environmental Information System
ORNL	Oak Ridge National Laboratory
ORR	Oak Ridge Reservation

OU	Operable Unit
PNL	Pacific Northwest Laboratories
PRG	Preliminary Remediation Goal
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RFI/RI	RCRA Facility Investigation/Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
S&M	Surveillance and Maintenance
SCQ	Sitewide CERCLA Quality Assurance Project Plan
SED	Sitewide Environmental Database
SFIA	Surplus Facility Inventory Assessment
SRS	Savannah River Site
SSAB	Site-Specific Advisory Board
STEP	Science, Technology, the Environment, and the Public
SWITS	Site-Wide Information Tracking System
TSD	Treatment, Storage, and Disposal
VE	Value Engineering
WM	Waste Management
WPAT	Waste Planning Assistance Tool
WSRC	Westinghouse Savannah River Company
WVEM	Waste Volume Estimation Methodology

EXECUTIVE SUMMARY

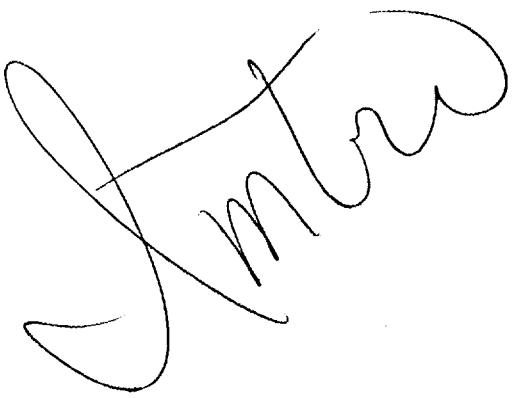
In an effort to improve its ongoing risk management activities, The United States Department of Energy's (DOE's) Office of Eastern Area Programs commissioned Oak Ridge National Laboratory's Center for Risk Management (CRM) to evaluate risk management activities at the three largest Eastern Area Program installations—the Fernald Environmental Management Project (FEMP), Oak Ridge Reservation (ORR), and Savannah River Site (SRS)—and recommend methods for strengthening these activities. The CRM examined not only risk assessment activities but also several other critical environmental management activities which are conducted as part of the environmental management process and are necessary to achieve DOE's goal of effectively managing the risks associated with the DOE Complex.

The risk management activities described and evaluated in this report include prioritization, stakeholder involvement, land use planning, risk assessment, cost estimation, data management, decontamination and decommissioning (D&D), waste volume estimation, and value engineering. To evaluate these areas, the CRM conducted a series of site visits to obtain information directly from program managers and environmental management teams at each installation. The CRM staff worked with designated site personnel as necessary to obtain additional information.

The CRM concluded that overall the Eastern Area Programs have developed significant and innovative programs in most of the areas evaluated. Each installation has gained unique, valuable experience while creating these programs, and collaboration among the installations would not only enable them to capitalize on each other's success but also would reduce the potential for redundancy.

The study also indicated that while some individual activities have excelled and have produced admirable results, the development of an effective and comprehensive process for planning all environmental restoration activities with a global perspective has not occurred. By following an integrated process that is initiated through global planning, projects can be prioritized and optimized so that resource allocations are effective and commensurate with each installation's needs and budget.

The recommendations contained in this report suggest areas where installations can improve procedures and benefit from each other's developed methodologies. The recommendations also include a conceptual model for environmental restoration strategic planning which can provide a framework for how the process should proceed.



1. INTRODUCTION

The United States Department of Energy (DOE) has committed to eliminating and managing the risks at its thousands of waste sites. To meet this commitment, DOE has emphasized evaluating and improving its ongoing risk management activities. As part of this evaluation, DOE's Office of Eastern Area Programs commissioned the Oak Ridge National Laboratory's Center for Risk Management (CRM) to evaluate risk management activities at the three largest Eastern Area Program installations—the Oak Ridge Reservation, Savannah River Site, and Fernald Environmental Management Project—and recommend methods for strengthening these activities.

Efforts to improve risk management activities cannot focus on risk assessment alone.

Because risk management activities support all environmental management activities, any effort to improve risk management cannot focus on risk assessment alone but must evaluate risk management and other connected activities that comprise the larger environmental management decision-making framework of which risk is an important, but not solitary, component. Therefore, in evaluating the risk management activities at the Eastern Area Program installations, the CRM examined not only risk assessment activities but also several other critical environmental management activities that are conducted as part of the environmental management process and are necessary to achieve DOE's goal of effectively managing the risks associated with the DOE Complex. These activities, in addition to risk assessment, include cost estimation, waste volume estimation, stakeholder involvement, land use planning, data management, prioritization, decontamination and decommissioning (D&D), and value engineering and are described in Section 2 of this report.

To determine the status of the risk management activities at the Eastern Area Program installations, the CRM conducted a series of site visits over the course of several months to obtain information directly from program managers and environmental management teams at each installation. Site personnel met with CRM staff for two-day meetings, in which selected experts presented the status of risk management activities at the installation. As a follow-up effort,

CRM staff worked with designated site personnel as necessary to obtain additional information. Descriptions of the status of each of the risk management activities addressed by the CRM are presented by installation in Section 3 of this report. The strengths of each installation's programs are presented, as are any barriers to implementing successful risk management activities.

Based on findings from the installation-specific investigations, the CRM formulated recommendations for improving risk management activities across the Eastern Area Programs. These recommendations, which are presented in Section 4 of this report, focus on activities that will help create a strong, consistent risk management program by building on the best facets of each installation's current risk management program.

APPROACH:

- *Series of Site Visits*
- *Follow-up Communication*

2. AREAS OF EVALUATION

Risk assessment and risk management are necessary to achieve the cost-effective remediation of DOE's hazardous waste sites, but they are not the only elements needed to attain this goal. The environmental management decision-making framework consists of several inter-related activities that must be implemented in a structured manner to ensure timely progress toward DOE's risk management objective. To assist the Office of Eastern Area Programs in evaluating its progress toward this goal, the CRM identified and investigated several critical activities that must occur in conjunction with risk assessment. Each component of this suite of activities is described in the following text with an emphasis on illustrating the importance of the activity in attaining the Department's goal. Each of these inter-related activities is vital to achieving effective risk reduction at DOE sites. Therefore, the activities are not listed in order of importance; instead, they are listed in roughly sequential order since, in practice, many of these activities should overlap or occur simultaneously.

The Environmental Management decision-making framework consists of several inter-related activities.

- **Prioritization.** Prioritization is the process by which DOE and its stakeholders determine the best sequence of activities to implement given the available resources. By supplying critical information about which activities offer the most significant risk reduction or the most value toward achieving DOE's environmental management mission, prioritization provides a defensible basis for the allocation of DOE's limited funds. Although prioritization is inherently risk-based, it is affected by many other factors, such as cost and technology availability. To make acceptable clean-up decisions, both DOE and its stakeholders must participate in the prioritization process.

Prioritization provides a defensible basis for the allocation of DOE's limited funds.

- **Stakeholder Involvement.** Establishing good stakeholder relations early in project planning is critical to successfully achieve effectively managed risks within the DOE Complex. Stakeholders, especially the state and other regulators, can dramatically influence many risk management and related decisions. Although it is especially important to have stakeholder involvement early in the decision-making phases (when funding allocations are made), stakeholder involvement must be considered throughout every aspect of risk management to ensure that DOE meets its commitment of establishing a strong partnership between itself and its stakeholders.

Stakeholders, especially state and other regulators, can dramatically influence many risk management decisions.

- **Land Use Planning.** Land use planning involves identifying, evaluating, and selecting future options for the use of land that is currently owned and controlled by DOE. Land use decisions dramatically affect many aspects of environmental management issues, including clean-up goals, remediation costs, magnitude of health risks to potential future users of the land, and the volumes of waste that will be generated by remediation. Because the land use planning process is so influential, it is imperative that DOE involve its stakeholders in the land use planning process.

Land Use Decisions Affect:

- *Cleanup Goals*
- *Remediation Costs*
- *Health Risks*
- *Waste Volumes*

- **Risk Assessment.** Risk assessment provides decision makers with information on potential human health and ecological risks posed by a site or an installation. This information is critical to many decisions, including prioritization, land use planning, technology selection, and waste volume estimation. Because risk assessments influence many different decisions, they are performed at various levels of detail and at various points in the

Risk Assessments provide critical input into the decision-making process.

decision making process ranging from screening level risk assessments (performed early in the process for prioritization) to detailed CERCLA risk assessments (performed much later in support of site-specific RI/FSs.)

- **Cost Estimation.** Successfully managing the risks within the DOE complex requires that DOE's limited resources be effectively used to achieve the most risk reduction (i.e., to get the most "bang-for-the-buck"). To best allocate limited resources, decision makers need to obtain reliable cost estimates from a global perspective. Effective cost estimation methodologies for projects and strategic planning are vital to overall environmental management and developing a comprehensive understanding of the problem.

Accurate cost estimates are critical to identifying, prioritizing, and effectively managing DOE's environmental problems.

- **Data Management.** Data management involves successfully collecting, storing, manipulating, and ensuring the quality of data used in risk management. To perform these activities, data managers develop and implement (1) programs designed to achieve consistency and reliability in data collection and (2) data management systems designed to collect, store, and manipulate the data gathered from many simultaneous data collection efforts. Of particular importance to effective risk management is establishing and maintaining a central database that houses and is updated with the most recent site characterization data for all sites at an installation.

Effective data management produces reliable and defensible assessment results.

- **Decontamination and Decommissioning.** D&D is the final stage in the life cycle of buildings, in which contaminants are removed and the buildings are dismantled or slated for reuse. Issues associated with

D&D can significantly affect other aspects of environmental management, such as estimation of remediation costs and waste volumes generated by remediation, future land use selection, and risk assessment. Many issues that affect D&D are similar to those that affect ER programs; however, D&D is addressed as a separate component of risk management because it brings its own unique issues to the risk management forum. To achieve cost-effective remediation of its sites, DOE must examine the tradeoffs between D&D and long-term surveillance and maintenance (S&M).

D&D brings its own unique issues to the risk management forum.

- **Waste Volume Estimation.** Waste volume estimation is used to determine the amount of waste generated by remediation activities. DOE cannot effectively plan for future waste management activities without accurate estimates of the volume of waste to be generated by remediation activities. Because the magnitude of waste generated by remediation strongly influences treatment, storage, and disposal (TSD) requirements, consistent and reliable waste volume estimates are needed to determine the TSD requirements and the risks and costs associated with them.

Waste Volume Estimation is an important issue for ER, D&D, and WM.

- **Value Engineering.** Value Engineering (VE) is an organized process that systematically analyzes each component or function within a project (e.g., a proposed remediation project) with the objective of identifying modifications of project scope that will minimize the life cycle cost of the project. By continually identifying opportunities for cost reduction, VE contributes to the overall goal of cost effectively managing the risks within

Value Engineering is instrumental in reducing costs in the face of decreasing budgets.

the DOE Complex.

The areas of evaluation defined and described in this section are important for attaining the Department's goal of managing risk within the DOE Complex in a cost-effective manner; however, other important issues may also be inter-related with these activities and with risk management. For the purposes of this report, the CRM focused on the areas that may be the primary risk management issues facing DOE. In Section 3, the progress and barriers within each of these areas are evaluated for FEMP, ORR, and SRS.

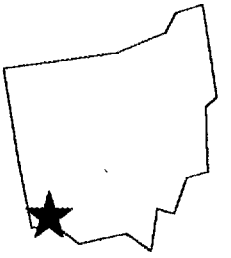

FEMP

3. STATUS OF RISK MANAGEMENT ACTIVITIES WITHIN EASTERN AREA PROGRAMS

Ongoing and planned risk management activities at the Eastern Area Program installations surveyed for this initiative are outlined in this section. Information about the activities described here was obtained from a series of site visits and follow-up investigations by the CRM. Each installation is presented individually, providing an installation-wide perspective of risk management activities. The strengths of each installation's program are highlighted along with any barriers to implementing a successful risk management program. The best risk management features at each installation often serve as the basis for subsequent recommendations to improve risk management efforts within the Eastern Area Programs.

3.1 FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

Since the cessation of uranium metal production in 1989, the sole mission of the Fernald Environmental Management Project (FEMP) has been environmental compliance and restoration. This fact, coupled with the relatively small size of the installation (1050 acres), has allowed FEMP to progress through the restoration process further and faster than any of the other Eastern Area Program (EAP) installations. Since 1992, FEMP has been managed for DOE by the Fernald Environmental Restoration Management Company (FERMCO). FEMP is divided into five operable units known as CERCLA/RCRA Units (CRUs), each of which is managed by a multi-disciplinary CRU team.



FEMP has made the most progress through the ER process.

Prioritization at FEMP. FEMP has no formalized, automated prioritization system for funding or risk-based ranking. Because FEMP is a small installation and baseline risk assessments have been completed for each of the five operable units (OUs), there is less need for a risk-based prioritization system than at the other EAP installations. At FEMP, the

FEMP Prioritization:

- ***No Formal System***
- ***Includes ER and D&D***

site managers know which sites will require the most funding to achieve restoration and maintain compliance because of their familiarity with the sites and the risks associated with them. The informal prioritization process used by site managers at FEMP encompasses both the ER and D&D programs at the installation.

Risk Assessment at FEMP. CERCLA baseline risk assessments have been completed and conditionally approved for all five OUs at FEMP, which is the most progress in risk assessment at a single installation throughout the DOE Complex. In the near future, risk assessment will be used at FEMP to assess the residual risk after completion of remedial activities. As required by CERCLA, this process will use risk assessment to confirm that each remediated site has successfully attained the preliminary remediation goals (PRGs) developed for the site.

Several important issues arose during the risk assessment process at FEMP. The lessons learned at FEMP can provide valuable insights to the other EAP installations as each proceeds with its risk assessment program. For the sake of brevity, these issues cannot be discussed in detail in this report. Rather, the risk assessment issues presented in the following list may serve as a starting point for collaboration among the EAP installations:

- Handling of background concentrations, especially differences in protocol for handling background for metals versus radionuclides
- Development of toxicity values, especially dermal slope factors for carcinogens
- Uncertainties in the risk assessment and the use of point estimates rather than ranges in calculating risks
- Site characterization data collection issues, including issues related to:
  - -number of samples

FEMP Risk Assessment Issues:

- ***Background Concentrations***
- ***Toxicity Values***
- ***Uncertainties***
- ***Data Collection***

-heterogeneity of samples

-detection limits

Cost Estimation at FEMP. A central FERMCO organization called the Estimating Services Group is responsible for preparing all cost estimates at FEMP, from conceptual pre-RI estimates to detailed estimates of planned remedial designs. The group consists of a core group and other members that are matrixed out as team members on the multi-disciplinary teams (or CRUs) that manage each operable unit, the latter being called "CRU estimators." In general, the CRU estimators generate all cost estimates before the remedial implementation/construction phase (i.e., they prepare cost estimates for the pre-RI, RI/FS, and RD phases). The core group is responsible for reviewing all estimates produced by the CRU estimators, maintaining a central repository of cost estimates, and generating estimates for all projects in and beyond the remedial implementation/construction phase.

FEMP Cost Issues:

- ***Inflation and Overruns from Poor Project Definition***
- ***Indirect Costs***
- ***Need for Automated System.***

To ensure consistency among estimates, standard methodologies and procedures are documented and all estimates are reviewed by the core group for format, content, and methodology. In addition, the estimating services group is in the process of implementing an automated cost estimating system based on a commercial program called Timberline. This system will house standardized unit costs and other data needed to prepare cost estimates. Recently, a DOE cost-estimating specialist has been collaborating with FERMCO personnel to improve the overall quality and consistency of cost estimates.

Several issues have been identified as potential barriers to effective cost estimation at FEMP. Some of these issues are presented in the following list. Although this list is not comprehensive, it gives an idea of the areas that may need further investigation to improve cost estimating at FEMP:

- Cost overruns due to poor project scope definition

- Potential inflation of cost estimates due to the nature of the prime contractor award fee contract strategy
- Historical underestimation of and difficulty in estimating or accounting for indirect costs
- Desire for an automated, electronic system for storing estimates, comparing estimates with actual costs, and facilitating estimate traceability
- Installation-wide cost estimation not an integral part of strategic planning

Data Management at FEMP. As part of its Sitewide CERCLA Quality Assurance Project Plan (SCQ), FERMCO has recently drafted a comprehensive Data Management Plan (DMP), which is expected to be completed for DOE in May 1995 and sets standards for all activities involving data used for environmental restoration purposes, including data acquisition, analysis, reporting, review, storage, transfer, and usage. The objective of the new DMP, which is an enhancement of a prior data management plan contained in the SCQ, is to integrate, standardize, and streamline all of the steps in data collection and management. While the DMP is being finalized, FEMP still uses the SCQ, which contains guidelines for establishing data quality objectives (DQOs). In this interim period, data management procedures are governed project by project using project-specific requirements such as those documented in RI/FS workplans. Furthermore, the overall data management process is not outlined, and data management staff are not aware of the data management process or the final disposition of data they review and verify. Such an approach results in inconsistency in and an inability to effectively trace data management practices, a lack of communication among data management teams, and duplication of effort by performing multiple reviews on the same set of data.

FEMP Data Management Issues:

- ***Preliminary DMP***
- ***Lag Time for Data Entry***

Site characterization sampling data at FEMP are stored in an Oracle-based central database called the Sitewide Environmental Database

(SED). In a two-step process, analytical results of site characterization sampling are collected in the Fernald Analytical Computerized Tracking System (FACTS) before being downloaded into the SED. Users can access data in SED at any time, even if data validation has not yet occurred. Data in SED are subject to various levels of data validation, after which all data in the SED are assigned an analytical support level of A through E depending on the level of quality assurance. Although site characterization data are entered into the SED before completion of the RI/FS, data still generally require up to six months after the date of sampling to appear in the SED. The new DMP is designed to streamline the data management process to decrease this amount of time. By speeding up the data management process, standardizing and integrating all data management processes, and promoting consistency between DQOs used across the installation, the final DMP will attempt to address many of the existing barriers to effective data management at FEMP.

Stakeholder Involvement at FEMP. FEMP is actively involved in stakeholder participation. The site has organized a Citizens' Task Force of stakeholders, which is equivalent to a site-specific advisory board (SSAB) and meets monthly to discuss issues such as the criteria for selecting future land uses and clean-up levels. FEMP personnel provide summary reports and presentations to the Task Force, and the Task Force provides reports of its resulting recommendations to DOE. As part of FEMP's public participation plan, the site has initiated a comprehensive community environmental education course entitled "Science, Technology, and the Environment, and the Public" (STEP). Developed by FEMP, DOE, community stakeholders, and local educators, STEP provides hands-on information about science and is designed to facilitate public participation in the decision-making process at Fernald.

Land Use Planning at FEMP. FEMP does not have a land use planning program, per se; rather, the future land use of the FEMP site will be dictated by the decision promulgated in the Record of Decision (ROD)

FEMP Stakeholder Involvement:

- ***STEP Educational Program***
- ***Citizens' Task Force***

Land Use at FEMP:

- ***OU5 ROD will Influence Land Use Decision.***

for FEMP's Operable Unit 5, the OU that consists of all the contaminated media at the site (such as soil and groundwater). Determined by negotiation between DOE and its stakeholders (including the Citizen's Task Force), the final remediation goals developed for OU5 will determine the future condition of the land. It is likely that the ROD will allow post-remedial conditions to vary across the installation, thereby allowing for a combination of future uses. Although no official recommendations regarding land use have yet been made, a likely option appears to be use of most of the land as a developed or undeveloped park with some parts of the site remaining industrial. Potential agricultural use of the land is being evaluated and has not been eliminated as an option. The OU5 ROD is expected in July 1995.

D&D at FEMP. The surplus facilities at FEMP constitute OU 3, which is integrated into the CERCLA process like the other OUs at FEMP. Because FEMP's sole mission of environmental restoration precludes any potential future use of the buildings at FEMP for production purposes, DOE signed an interim ROD in 1993 that calls for removal of the buildings at the FEMP site. D&D efforts at FEMP focus on characterizing the buildings only to the extent necessary to ensure worker safety during building dismantling and removal. Characterization of buildings is done only after the buildings have been demolished to determine the waste volumes and the method and location for disposal of debris (e.g., concrete, steel) and contaminants. FEMP has made significant progress toward its D&D goal by removing Plant 7, a major surplus production facility. Two other large facilities, Plant 4 and Plant 1, are scheduled for removal in 1995, with the possibility of removal of three additional buildings if funding and scheduling permit.

FEMP D&D:

- ***Interim ROD for OU3 pre-empted detailed characterization***
- ***Significant D&D progress made.***

Waste Volume Estimation at FEMP. FEMP has developed an innovative tool to calculate the volume of contaminated soil to be excavated and treated or disposed of to achieve target risk-based clean-up goals. This tool calculates the depth to which contaminants have migrated

and uses that information to estimate the area and volume of soil to be excavated, called a "footprint." A modification of the footprinting method is used to estimate the volume of groundwater to be removed to meet cleanup levels. FEMP does not use footprinting for waste volume estimation of buried waste because historical estimates provide enough information on the volumes of buried wastes to make application of the tool unnecessary. The footprinting method is beneficial because it facilitates the comparison of cost and waste volumes generated for remediating to different risk levels.

Value Engineering at FEMP. Although FEMP has historically applied cost analysis and process improvement techniques, only recently has VE been implemented as a distinct program. Minor VE efforts were started a couple of years ago, but FY94 was the first year that VE produced a significant cost avoidance (approximately $5.6 million). VE has been used at FEMP to evaluate the cost effectiveness of dismantling efforts for OU3, and FEMP intends to implement VE at other OUs in the future. The installation does not have a central VE organization; rather, each CRU team has a member trained in or responsible for subcontracting VE as a line task for each project.

Summary. FEMP has progressed through the environmental restoration process further than the other EAP installations. In so doing, it has gained valuable experience and developed useful methodologies in several areas, including risk assessment, stakeholder involvement, and waste volume estimation. FEMP is also on the forefront of major D&D activities. FEMP's experience in these areas should be shared with the other EAP installations. FEMP recognizes weaknesses in some risk management activities and is working to eliminate them. Areas where FEMP may benefit from collaboration with other installations and from internal improvements to its programs include the VE program, data management (the future Data Management Plan), and cost estimation.

Value Engineering:

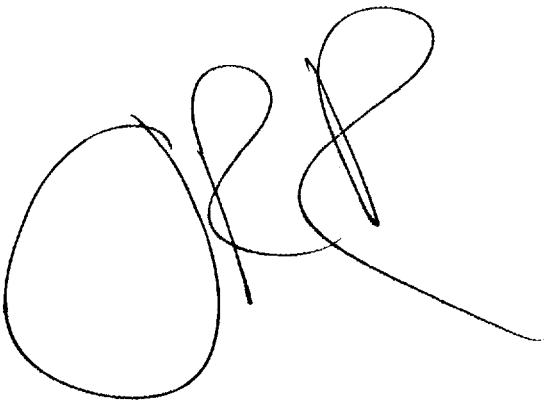
- *In Formation Stages*
- *No Central VE Organization*

Strengths:

- *Risk Assessment*
- *Stakeholder Involvement*
- *Waste Volume Estimation*
- *D&D*

Focus Areas:

- *Value Engineering*
- *Data Management*
- *Cost Estimation*



3.2 OAK RIDGE RESERVATION

The 37,000 acre Oak Ridge Reservation (ORR) was opened in 1943 as part of the World War II Manhattan Project. As a result of 51 years of operation, portions of the reservation became contaminated, which led to ORR's placement on the National Priorities List (NPL) in 1989. Although the installation's mission has changed, work is still conducted at the three facilities comprising the ORR: the Oak Ridge National Laboratory (ORNL), the Y-12 Plant, and the K-25 Site. These facilities house ongoing programs in research, technology transfer, hazardous materials storage, and environmental management. The ORR is managed for DOE by Martin Marietta Energy Systems, Inc. (MMES).

Prioritization at ORR. At the ORR, the Environmental Restoration Benefit Assessment Matrix (ERBAM) is used to prioritize funding for both ER and D&D activities. ERBAM is a qualitative multi-attribute utility model designed to provide management with a common framework for evaluating and comparing existing or potential risks and benefits associated with environmental programs. A panel of experts generates a project score based on the severity and likelihood of risks occurring both before and after a project is implemented. The net benefits of a project are determined, yielding a numerical value based on relative weighting factors for several categories, including public health and environmental protection, site personnel safety, stakeholder preference, and cost and operational performance impacts. The ORR has recently omitted regulatory compliance from the prioritization matrix, thereby yielding a risk-based ranking. The Federal Facility Agreement (FFA) milestones are negotiated annually, which allows ORR to present the prioritization results to its regulators to negotiate risk-based changes in compliance. This method of using a risk-based ranking to negotiate with regulators has been well-accepted by the regulators and has resulted in successful re-negotiations of compliance agreements and better protection of human health at the installation.

OAK RIDGE RESERVATION

- *Oak Ridge National Laboratory*
- *Y-12 Plant*
- *K-25 Plant*

Oak Ridge Prioritization:

- *Multi-attribute utility model*
- *Allows re-negotiation of FFA*

The ER and D&D programs are prioritized together using ERBAM. However, for D&D, ERBAM is used to prioritize for resource allocation, and Martin Marietta's Integrated Risk Management System (IRMS) is used to further define project definitions and the order of project starts. With IRMS, buildings are categorized into groups (e.g., high assay, process buildings, cooling towers) and prioritized within each category.

Risk Assessment at ORR. Seventeen risk assessments have been completed at ORR, most of these being CERCLA baseline risk assessments. In addition, eight more are scheduled for completion by FY95. Additional risk assessments have been completed and are scheduled for off-site locations and for Portsmouth and Paducah. In addition to CERCLA risk assessments, ORNL has completed a site-wide risk assessment-based prioritization of waste area groupings (WAG) and the ORR plans to perform similar assessments at its other plants. ORR has developed a risk assessment strategy document to obtain written regulator agreement on the information included in risk assessments, which should hasten negotiations with regulators once risk assessments have been completed. One potential barrier to current and future risk assessments is access to classified source term data, which result in classified risk assessments. Risk assessment classification prevents public access to information and reinforces the lack of trust that DOE has traditionally received from its stakeholders. This obstacle may become a larger issue as more sites progress through the CERCLA process and the number of risk assessments increases. Another barrier in the risk assessment process is data transition from the RI to the FS stage. Data transition has been problematic because competing contractors perform the RI and FS, and information sharing is hampered by antagonism and contractor competition. More effective central oversight and management of risk assessments by one risk assessment group, as done at FEMP, could eliminate the lack of cooperation between contractors.

Oak Ridge Risk Assessment Issues:

- ***Classification of Data***
- ***Data Transition***
- ***Competing Contractors***

Cost Estimation at ORR. The ORR has established a standard

method for estimating costs, which is based on work scope and expert opinion. An Observational Approach Workshop is held at Oak Ridge by the project team at the beginning of a project to determine the remediation approach and scope of work for each project. Upon completion of the workshop, professional cost estimators use the scope of work established at the workshop to create an estimate based on historical cost data, cost relationships, and national and local pricing guides. The same estimators are used for all sites, and they have access to all estimates, thereby providing a benchmarking standard. The project engineer serves as the primary customer interface in the development of the estimate. The ORR has one central cost estimating point of contact, which provides cost estimating guidance and makes estimators readily available to project engineers. Many of the preliminary estimates are based on what is an "assumed" scope and are calculated while site characterization is being conducted. The resulting implication is that the characterization reveals an increased scope of work and the estimate must be altered.

The ORR uses the cost estimates prepared by these experts to prioritize projects on a yearly basis based on the funding allocated to the ER program. The ORR does not, however, use the estimates in any form of risk-benefit analysis, which could provide stakeholders and regulators a means to compare alternative courses of action for a particular site. In addition, the cost estimates are limited to a project-specific basis and are not used as input into strategic planning for the ER program.

Once an accurate estimate is established and the scope of work finalized, the architectural and engineering firm (A&E) contractor at ORR is responsible for opening the project for bids. The OR Operations office, however, has mandated that companies bidding on the contract must limit the number of company employees working on the project to five and hire workers from the union to fill further labor requirements. Contractors typically avoid this situation because it can potentially reduce internal quality control and the ability to provide safety and security, increase the

Oak Ridge Cost Issues:

- ***Reworking estimates with changing work scopes***
- ***Not used for risk-benefit analysis***
- ***Limits on contractor bidding***

training and certification costs, and increase the risk of worker injury and company equipment damage. This mandate reduces the competitive bid atmosphere since few contractors are willing to agree to these restrictions.

To resolve some of these issues, the ORR is developing its own central database, the Management Control Information System (MCIS), which will contain information such as baseline estimates, milestones, and work scope by Activity Data Sheet (ADS) number. The ORR also plans to use a database being developed by Pacific Northwest Laboratories (PNL), which can be applied to all DOE sites as a benchmark to gauge whether cost estimates are on target.

Stakeholder Involvement at ORR. The ORR has formed a Local Oversight Committee (LOC), which serves as the site's interim site-specific advisory board and which acts as the catalyst for public involvement in decision making. ORR is currently beginning to screen applicants for an SSAB but is just in the formative stages of that process and has no concrete time frame for when an SSAB will be established. Public meetings remain the main vehicle for updating and involving the public in remediation decisions at the three plants. Over a span of two months, ORR holds an average of nine public meetings on various topics, including clean-up decisions and future land use. These meetings are held throughout the region (including 18 counties) because of ORR's large economic impact on the area. The ORR plans to examine the possibilities of involving the public in innovative ways, such as electronic bulletin boards and Internet availability. Currently, ORR is experimenting with involving stakeholders earlier in the decision-making process by forming a citizen's working group that has convened throughout the assessment (RI/FS) of East Fork Poplar Creek; the process has so far been very effective in providing DOE with earlier feedback. The balance of regulatory power at ORR leans toward the state because state regulators tend to disagree internally and have a high personnel turnover, causing risk assessment teams to frequently renegotiate risk assessment requirements.

Oak Ridge Stakeholder Involvement:

- ***Local Oversight Committee***
- ***Screening for SSAB Members***
- ***Frequent Public Meetings***
- ***Citizens' Working Group***

The ORR has developed a risk assessment strategy document to obtain written regulator agreement on the information included in risk assessments. Using this document, ORR can proceed with automating their risk assessments rather than being stalled by changes in regulator requirements.

Land Use Planning at ORR. Oak Ridge has developed a future land use decision process called the Common Ground Process. This process is a three-phase approach involving stakeholders, the general public, regulators, and DOE to determine the future land use of the reservation. Phase One of the process was to contact the public within a 50-mile radius of the site to obtain opinions on the ultimate purposes of the land at the reservation. The University of Tennessee, Knoxville, was subcontracted to hold public meetings; identify and contact "discovery groups," which would focus on special interests (e.g., demographics, environmental justice); and person-to-person meetings with elected representatives. This phase has been completed, and all of the individuals contacted have provided preferred future land use scenarios.

Oak Ridge Land Use Issues:

- ***Cost of reaching land use***
- ***Technical requirements to meet goals***

Phase Two, scheduled for completion in April 1995, involves conducting a variety of assessments on all of the land use ideas submitted to the Common Ground Process from these different groups. Human health risks, the economic impact to the surrounding area, and the ecological risk to the area for each scenario will be determined.

This information will be presented in Phase Three to the contacts identified in Phase One so that a final decision can be reached by all involved parties by the end of the fiscal year. The purpose of this final phase is to allow stakeholders to analyze the information gathered and make tradeoff decisions. Once concurrence from all involved parties is reached, the final land use decision will be forwarded to DOE Headquarters for approval. The Common Ground Process, however, is not considering issues such as the cost of cleaning up the site to reach the desired land use

or the availability of technologies that can reach these goals. These are key elements in any decision process and should be presented as variables in the tradeoff studies.

Data Management at ORR. The ORR ER program is addressing data management from a comprehensive programmatic standpoint. An ER Data Quality Program (DQP) has been established to ensure a consistent, comprehensive, and efficient approach for defining, documenting, managing, and maintaining the quality of environmental measurements data generated for the ER program.

Oak Ridge Data Management:

- *ER Data Quality Program*
- *Data Management Plan Developed*
- *OREIS*

To address the most relevant data management issues, the DQP has developed and issued the Environmental Restoration Program Data Management Plan (EMDMP) and supporting standard operating procedures. The EMDMP specifies the requirements for control of data management processes that cover the complete data life cycle and data management systems. It applies to all ER technical integration programs, site programs, and projects. The DQP provides training for implementing the EMDMP and quality assurance reviews to ensure correct and consistent implementation across the ER program. The DQP also supports DQO and data validation activities through procedure development, training, and coordination of user working groups.

The following are areas identified as possible inhibitors of EMDMP efficiency:

- Procedures should be developed for a consistent approach to evaluation of historical data useability for ER purposes.

- A data validation strategy needs to be developed by the project before performing field sampling or placing work with analytical laboratories. Another indication should be that a validation strategy may be developed and refined from project DQOs to data

quality assessment. The objective is that the data user will readily receive validated data ready for their intended use.

- The D&D program is not considered in the EMDMP to have interactions with the DQP.

These issues are recognized and are being addressed by the appropriate groups through the DQP.

Management of geographical data is documented, and data management and quality assurance guidelines are provided for users of Geographical Information System (GIS) technology and databases. The ER program developed the Oak Ridge Environmental Information System (OREIS) to provide a consolidated database of quality assured ER, compliance, and monitoring data. Specifically, the database contains known quality measurements and spatial data from groundwater, surface water, sediment, soil, air, and biota. In addition, the database contains descriptive and qualifier data to help document data quality and enable end users to analyze the appropriateness of the data for secondary purposes. OREIS also maintains a base map and overlays of various coverages showing areas such as buildings, roads, environmentally sensitive areas, WAG and OU boundaries, and sampling locations. OREIS is conducting a pilot study on the impact of getting data into the system within 105 days after sampling occurs.

D&D at ORR. The ORR D&D program is one of the most complex in the Eastern Area Program since it houses some of the largest buildings, such as the K-25 gaseous diffusion plant, which are contaminated with large quantities of contaminants, some of which are unique or problematic (e.g., transuranics). The largest issue facing the D&D program is identifying waste disposal options for the facilities once they are demolished. Currently, the metal contained in the facilities cannot be released as scrap metal or for recycling since regulators (e.g., NRC,

Oak Ridge D&D Issues:

- ***Waste Disposal***
- ***Containment Over Time***
- ***Volumetric Contamination***
- ***New Regulatory Involvement***
- ***Limited Characterization Data***
- ***Limited Funding***

EPA) have not set a *de minimus* volumetric contaminant level. This is the level of contamination remaining on materials considered acceptable, thus classifying the material as non-hazardous. In addition, debris from D&D operations may be so highly contaminated that disposal sites will not accept it. This issue leads to capacity problems in finding a final waste disposition location. No on-site disposal option at the ORR exists, which leaves Hanford and the Nevada Test Site as the only two alternatives for low-level wastes.

Another major issue for the D&D program at ORR is the potential for contaminant release if funding issues and waste disposal options are not resolved in sufficient time. Buildings can only be maintained with custodial work (i.e., roof replacement, piping) for a certain period of time before the structure degrades beyond a repairable state and collapses. As is true for most D&D programs, the majority of funding is spent on S&M costs. Currently, no program at ORR exists to reduce S&M activities in a manner similar to EM-60's, which may allow more money to be allocated for actual demolition. The ORR instituted a program similar to EM-60's in the past, but could not continue the program with limited funding.

D&D Risk Assessment. In anticipation of the D&D program being mandated by CERCLA, Oak Ridge developed a risk assessment methodology using CERCLA guidelines and providing guidance on issues unique to buildings. In addition, ORR has developed a screening risk methodology to assist in identifying early actions and assist in prioritization, which can feed into the ERBAM system. ORR's goal is to obtain regulatory approval on the risk assessment approaches such that baseline risk assessments for D&D can be performed using only available characterization data, based on the end-use determination of the building rather than the detailed characterization data required for other ER projects. Personnel in the program have not initiated regulatory input on the risk assessment methodology and have not determined when or how to approach the regulators with this new procedure.

D&D risk assessments at ORR face a lack of characterization data. Many of the buildings in the D&D program have never been fully characterized, limiting the ability of the risk assessors to conduct comprehensive risk assessments where they are warranted.

Waste Volume Estimation at ORR. The ORR is developing a set of waste volume estimation tools. The set currently consists of two components: (1) the Waste Volume Estimating Methodology (WVEM), which is designed to provide guidance on estimating primary waste streams, and (2) the Waste Planning Assistance Tool (WPAT), which uses information about primary waste volumes predicted by the WVEM to estimate the volume of secondary waste based on material balances of a select set of ER technologies.

Oak Ridge Waste Volume Estimation:

- *Lack of estimation criteria*
- *Limited number of technologies*
- *Uncertainties in WPAT input*

The WVEM predicts the volumes and types of waste generated during site characterization and actually provides very little guidance on estimating the amount of soil or buried waste requiring excavation. It provides no guidance on estimating the amount of groundwater requiring removal. The limited guidance on estimating contaminated soil volumes resulting from remediation assumes that negligible contaminant migration has occurred and that all contaminated soil is removed. No risk-, cost-, or ARAR-based criteria for estimating these primary waste loads are presented. In practice, waste loads are predicted by ER technical staff or remedial project managers using the best available information to generate an approximate estimate.

D&D Risk Assessment:

- *Methodology not negotiated with regulators*
- *Methodology is flexible and allows use of various levels of data*

Although in theory the WPAT will be useful in predicting secondary waste volumes, its utility will be limited because (1) it can only address a limited number of the possible ER technologies that may be applied at ORR, and (2) any consistency of the secondary waste stream predictions is swamped by the uncertainties surrounding the primary waste stream estimates, which are the principal inputs to the WPAT.

Value Engineering at ORR. The VE program established at ORR is an integral part of the Central Engineering Services. Since programs in Oak Ridge are not required to implement VE, only WM and defense programs have taken regular advantage of the service, requesting the VE teams to review designs as they deem necessary.

Value engineering is conducted at ORR once a conceptual design report is completed. This report is then channeled to the VE project manager, who organizes a team of professional engineers certified as Value Engineering Specialists, who perform the function analysis on the project. The team uses its engineering expertise to evaluate the design and deliver to the customer a proposal that outlines the changes that would create savings. It is up to the program personnel to review this proposal and implement what they find appropriate.

Unfortunately, the VE department is funded only from money it receives on a "project-to-project" basis; therefore, the department is struggling. The ER program has used the VE service on one project, which resulted in $15.5 million in savings from the original estimated total project cost. Although the benefit of VE has been demonstrated, ER has expressed little interest in using this technique in its projects.

Summary. The ORR has developed strong programs in the environmental management areas of prioritization, risk assessment, cost estimation, and land use planning. The multi-attribute prioritization system (ERBAM) is a useful tool that can integrate ER, WM, and D&D programs across an installation. In risk assessment, ORR has made progress on CERCLA risk assessments for ER sites and has developed a ground-breaking D&D risk assessment methodology that can serve as an example for other EAP sites. The cost estimation and land use planning programs at OR are both under development but have demonstrated significant progress towards useful automated systems (in the case of cost estimation) and consensus-building programs (in the case of land use

Oak Ridge Value Engineering:

- *Limited Funding*
- *Limited Use of Program*

Strengths:

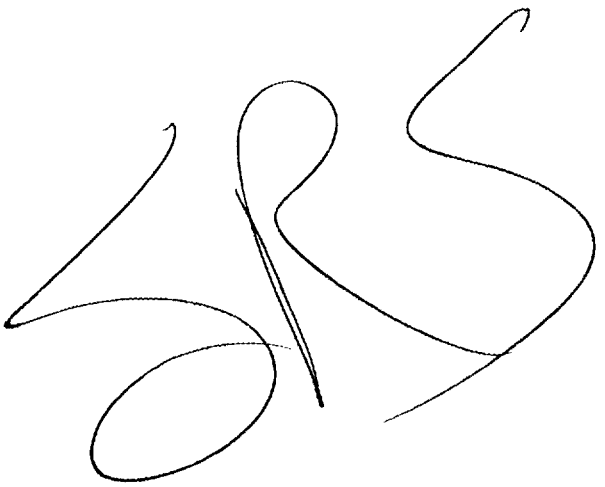
- *Prioritization*
- *D&D Risk Assessment*
- *Stakeholder Involvement*
- *Land Use Planning*

planning).

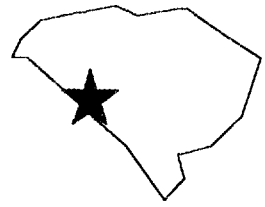
While ORR emphasizes its strengths and continues to develop risk management tools, the installation could benefit from collaborating with other Eastern Area Program installations in the areas of D&D, waste volume estimation, VE, and stakeholder involvement. Largely because of the installation's enormous program, the area of D&D has faced many difficult barriers and is struggling to overcome them. Waste volume estimation and VE efforts at ORR could be improved by automation and by using more detailed, accurate methods. The ORR could draw from the experience of other EAP installations as it begins to form its SSABs and solicit more organized stakeholder involvement at the installation.

Focus Areas:

- ***D&D***
- ***Waste Volume Estimation***
- ***Cost Estimation***
- ***Value Engineering***



3.3 SAVANNAH RIVER SITE



The Savannah River Site (SRS), managed by the Westinghouse Savannah River Company (WSRC), handles and produces nuclear materials for government use and civilian purposes; however, since the production facilities occupy less than five percent of the site area (325 square miles), its major focus is waste management and environmental restoration. The site was placed on the National Priorities List (NPL) in 1989, but the FFA was only recently signed in 1993, shifting the regulation of the sites at SRS from RCRA to CERCLA. Because of this recent shift, SRS has not progressed as far through the CERCLA process as other Eastern Area Program installations.

Prioritization at SRS. At SRS, EPA's risk-based preScore Hazard Ranking System (HRS) is used to prioritize sites for funding. The preScore HRS is a mathematical evaluation methodology used to assess sources, pathways, and receptors. The system evaluates four pathways to yield a score for a site: air, groundwater, surface water, and soil exposure. Once a score is determined, each site is prioritized in a strictly risk-based ranking. Fifty-three RFI/RI operable waste units have been ranked based on existing screening and characterization data, which are usually very limited. Additionally, seven RCRA or "RCRA style" surface closure sites, six RCRA groundwater operable units, and the SRS as a whole were ranked. Regulatory agencies require SRS to initiate seven field starts per year in the ER program. Site managers determine the sites at which they will start remediation by balancing the limited funding among top priority projects, which are usually more costly, and lower priority, lower cost projects.

Pre-Score HRS:

- *Developed by EPA*
- *Mathematical Methodology*
- *Evaluates 4 Exposure Pathways*
- *Risk-based Ranking*
- *Not used for D&D Program*

At SRS, the D&D program has just recently become integrated with the ER program. An annual Surplus Facility Inventory and Assessment (SFIA) initiates the prioritization of D&D facilities. Buildings are categorized into groups based on when the facility is surplus (e.g.,

surplus now, in the next five years), and are then prioritized using a "threat matrix," based on the impacts and likelihood of seven categories similar to the multi-attribute system used at ORR. The prioritized list of facilities is then used as input to D&D funding decisions.

Risk Assessment at SRS. SRS's Federal Facilities Agreement was signed in 1993, whereby its risk assessments became mandated by CERCLA. Previously, SRS conducted risk assessments as mandated by RCRA. To date, SRS has completed 13 RCRA risk assessments. In addition, to meet SRS's regulated schedule, five CERCLA risk assessments are ongoing or scheduled for completion in FY95. According to the FFA, the RCRA risk assessments will satisfy the requirements for CERCLA baseline risk assessments, eliminating the need to redo the work already completed. The balance of regulatory power at SRS is equal among the state, DOE, and EPA; however, the EPA tends to have more sway in SRS's risk assessments and compliance agreements. SRS completed its first CERCLA baseline risk assessment in November 1994; thus, the site has not had any experience at presenting and negotiating CERCLA risk assessment content or RODs with its regulators. This lack of CERCLA experience is one barrier to risk assessment at the site. Although project managers can draw to some extent upon their experience with RCRA assessments to assuage this difficulty, RCRA risk assessments have been performed for closed or capped units, which are different types of evaluations than those performed under CERCLA. In addition, the site anticipates potential difficulties with stakeholder involvement since it has not yet presented CERCLA risk assessments and subsequent RODs to the public.

SRS Risk Assessment Issues:

- ***Recent Transition to CERCLA***
- ***Limited Experience Negotiating CERCLA Risk Assessments***
- ***Anticipation of Difficulties with Stakeholder Involvement***

Cost Estimation at SRS. Cost estimation for individual projects at SRS is done in-house by WSRC for consistency across the installation. Cost estimators at the site use a simplified version of the Army Corp of Engineers model M-CACES, which produces unit cost estimates for remedial design and construction. SRS uses Hanford models to correlate

cost estimation and remediation schedules (driven by regulators), which integrates the two elements and provides more useful cost estimates. SRS is building an estimating system similar to systems being developed at FEMP, which will combine cost models and annual operating cost estimates. This merger should improve cost estimating ability by linking historical cost data to model-generated unit cost estimates, resulting in a benchmarking tool.

Cost Estimation Efforts:

- *M-CACES Model*
- *Building system to merge cost models and operating cost estimates*
- *Life cycle estimation methods developed*

Life cycle cost estimation methods have been developed to increase the accuracy and efficiency of cost estimation. Cost estimates were developed for all ER projects and then combined to form a program-wide estimate. These life-cycle cost estimates will be complete by March 1995. The cost data generated will be used as input for strategic planning purposes such as the fiscal feasibility of technologies used for remedation work. In addition, the data will be used as input into various land use scenarios.

For D&D, cost estimates are developed by outside contractors and are based on similar facilities that have completed the D&D life cycle, using factors to size up or down for a given project.

Barriers to cost estimation at SRS are variable and include delayed guidance from DOE and the regulators, deviation of regulators from their own rules, and an inappropriate level of detail required in cost estimates for projects to be undertaken 20–30 years in the future. Lengthy delays in regulator response contribute significantly to cost overruns and project delays, although SRS acknowledges that a primary cause for this delay is the sheer number of work plans submitted to regulators.

Stakeholder Involvement:

- *Struggling to keep SSABs abreast of site activities*
- *Overwhelming amount of information*
- *Alternative methods for information dissemination being investigated*

Stakeholder Involvement at SRS. Stakeholders are identified by building a mailing list and holding workshops and meetings; those present at meetings are recorded as well as interested parties who contact SRS independently. For WM activities, SRS uses standard public feedback

channels, such as holding workshops for project scoping. SRS is currently struggling with public involvement in the ER program. The site has a site-specific advisory board, whose main concerns are future land use, remediation of the ER waste units, and nuclear materials disposition. While SRS has held priority planning workshops, they have been largely unsuccessful because of the overwhelming amount of information presented. SRS is attempting to group its sites into operable units; however, before this grouping was complete, sites were treated separately, and the large amount information on individual sites was sometimes too much for audiences in a workshop forum to digest. SRS plans to make information available in ways other than workshops (e.g., electronic bulletin boards) to get stakeholders involved in the ER program in earlier stages.

Land Use Planning at SRS. Land use planning at SRS is in its formative stages. The site has appointed a land use steering committee, developed land use policy guidelines, initiated GIS consolidation, and developed land use categories and maps for present conditions and future land use areas. SRS stakeholders have been involved in the initial process of developing the installation's land use planning strategy, and DOE is continuing to work with SRS's SSAB on this strategy.

Data Management at SRS. At SRS, responsibilities for data management are split between the ER Department (ERD) and the Environmental Geochemistry Group (EGG). The ERD develops DQOs, and the EGG handles the laboratory interface, data verification, and data validation. The ERD then assesses the data in the final step to complete the data management process. The EGG has developed an extensive, structured process to sample, track, and validate data. Project managers in the ERD, who serve as the customers of the EGG, work closely with the EGG to ensure data requirements are met. The EGG handles more than 700,000 lines of data annually; therefore, most of the data verification process is electronic, which reduces the potential for error.

The two data management groups use distinct program-specific documents to accomplish their respective tasks. SRS has no consolidated data management plan for both ERD and EGG to provide guidance and requirements for data management activities. The fragmentation of the data management groups and the lack of an overall data management plan may result in inconsistent interpretations of EPA guidance. The existing EGG program overview document provides guidance for groundwater monitoring and soil characterization, but it needs to include similar guidance for other parameters as well.

As a tool to assist the data management process, SRS uses an innovative database, the Geochemical Information Management System (GIMS), to store and retrieve groundwater characterization and monitoring data. Before the development of GIMS, SRS stored groundwater sampling data in flat electronic format (ASCII) in a mainframe, where its format and storage made it less accessible to the many data users on-site. The GIMS overlays site maps; therefore, users can retrieve historical data and compare them with current measurements at any given monitoring or sampling site on the installation. GIMS provides an integrated set of tools to perform many functions of environmental monitoring programs, including sample scheduling, data review, invoice checking, data reporting, analytical laboratory evaluation, and long and short range planning. Quality assurance records are maintained automatically by GIMS for each of its data records. The system also provides a client and server user interface, which allows users across the installation to access and process the data easily, quickly, and in whatever format they need. SRS is further developing GIMS to include waste characterization data and other environmental media, such as soil. These additions to the system should be complete by January 1995.

SRS Data Management:

- ***Automated retrieval, storage, validation***
- ***Groundwater data input into GIMS***
- ***Soil and other media under development in GIMS***
- ***Data teams coordinated and provide checks and balances***
- ***Efforts underway to make data more accessible within GIMS***

D&D at SRS. The SRS D&D program is relatively new; this is the first year D&D has been an integral program within ER. SRS performs an annual Surplus Facility Inventory and Assessment (SFIA), during which

a majority of the facilities are characterized to some extent. In the SFIA, facilities are categorized into groups according to when they are classified as surplus. The buildings classified in groups representing surplus now or within five years are subject to further assessment: the physical and system condition of the facilities are assessed, surveillance and maintenance (S&M) costs are estimated, contamination conditions are characterized, contaminant inventories are identified, and safeguards and security information is gathered. Next, the facilities are subject to a risk-based ranking, using a threat matrix (see prioritization at SRS). Budget and cost estimates are generated for managing the high ranking facilities expected to transfer to EM within a specified time period. The SFIA risk ranking is performed annually to account for the decreased risk of previously high ranking buildings as D&D actions are completed. Using the SFIA process for budget requests, this fiscal year SRS has demolished 11 buildings and initiated D&D projects on four other buildings.

SRS is organizing all the DOE requirements for buildings into a document that will describe the requirement, how it is met, and categorize the condition of the facilities. From this, SRS plans to develop a database that will enable D&D managers to input the characteristics of a building and receive the corresponding regulatory and safety requirements. SRS anticipates this database will increase its compliance in the D&D area.

Like other D&D programs throughout the DOE Complex, the SRS D&D program will shortly become mandated by CERCLA, thereby changing its regulatory drivers. This change may not affect SRS as dramatically as other EAP installations since SRS just recently became mandated by CERCLA. Other issues that the SRS D&D program faces are limited funding, waste disposal, and long-term containment of contaminants inside facilities. These are the same issues that other EAP installations must address, and satisfactory solutions to these problems will arise only through collaboration within EAP and negotiation with DOE and the regulators.

SRS D&D Issues:

- ***New Program***
- ***Limited Funding***
- ***Waste Disposal***
- ***Containment over Time***
- ***Managing Integration with ER Program***

Waste Volume Estimation at SRS. Waste volume estimation at SRS is accomplished by using "ballpark" volume estimation methods and calculations, much the same way as ORR. Engineers at the site determine the scope of contamination from site reports and estimate volumes of remediation-generated waste by using basic mathematical calculations (e.g., dimensions of the site multiplied by the depth of contamination). Systems engineers estimate waste volumes to be generated from D&D activities by examining the size and materials of facilities (from architectural drawings) and by determining the different waste types involved (i.e., mixed waste). From this information, engineers estimate the waste streams and volumes of waste using estimation techniques similar to those used to estimate remediation-generated waste.

Value Engineering at SRS. Value engineering at SRS is part of the site-wide engineering program and has been implemented since April 1991. In most cases, all projects over $5 million are subject to VE screening. SRS's implementation of VE for qualifying projects has saved DOE more than $70 million through FY94.

Summary. SRS has developed innovative programs in data management and D&D. Moreover, the installation's preliminary cost estimation methods and efforts are an asset to the site. The GIMS database and the D&D program's SFIA process represent two of SRS's greatest risk management strengths. SRS's information and experience in these areas could be shared with other installations to improve risk management program-wide.

While SRS emphasizes its strengths and continues to develop risk management tools, the installation could benefit from collaborating with other Eastern Area Program installations in the areas of stakeholder involvement, CERCLA risk assessments, and waste volume estimation. Largely because of the installation's recent transition from RCRA to CERCLA, the areas of risk assessment and stakeholder involvement are

Strengths:

- ***Data Management***
- ***D&D***
- ***Preliminary Cost Estimation Methods***

Focus Areas:

- ***Stakeholder Involvement***
- ***Risk Assessments***
- ***Waste Volume Estimation***
- ***Value Engineering***

not as strong as those at FEMP and ORR. Waste volume estimation efforts at SRS could be improved by automation and by using more detailed, accurate methods.

Recommendations

4. RECOMMENDATIONS

In the current climate of tight budgets and increased demands for tangible results from performance of environmental restoration activities, Eastern Area Program installations are under pressure to improve their risk management activities. However, efforts to improve environmental restoration cannot focus on risk alone but must be placed within the larger context of a global environmental management decision-making framework. This framework must focus first on identifying activities that can best benefit from the limited resources available and then on increasing efforts to reduce the escalating costs associated with site remediation. To accomplish these goals, the environmental strategic management process should be structured around four phases:

GLOBAL PLANNING. Global planning provides an installation- and program-wide perspective on the risks, costs, and technology needs involved in environmental restoration. Global planning is initiated with a preliminary survey of all relevant, current and historical data related to problems associated with sites and releases. Presumptive technologies to address these problems are selected and used as input into site-wide risk and cost models to obtain a global perspective of the major risk and cost drivers at each installation. Waste volumes to be generated during remediation are also obtained. Technologies driving the cost of remediation can be pinpointed and alternatives developed.

PRIORITIZATION. Once a global view of the major risk and cost drivers at an installation is obtained, decisions must be made annually about which environmental problems should be funded. Prioritization is the process by which DOE and its stakeholders determine the best sequence of activities to implement given the available resources. For prioritization to be effective, it must have strong stakeholder input.

OPTIMIZATION. Once specific remediation projects have been targeted by installation-wide prioritization, individual project planning is initiated. Project managers can reduce and optimize the preliminary projected costs of a project by using value engineering techniques, which analyze the design of each project; the feasibility of technologies; and the most effective and efficient use of scheduling, characterization, scoping, and other resources. Value engineering will optimize a project's costs by closely examining alternative project designs and scopes which will create demonstrable cost savings. The output is a well-defined project that effectively employs its allocated funds.

PROJECT EXECUTION. The final phase of the environmental strategic management process is project execution. If the strategic planning process has been followed, the previous phases will have contributed to a successful project. Environmental restoration will be completed first on those sites that pose the most health risk, projects will be optimized to ensure the most effective use of limited resources, and restoration of the installation will progress more efficiently and with reduced cost.

A conceptual design of this environmental management process is illustrated in Figure 4-1.

Integration and implementation of this environmental management process is a dynamic effort, which requires the implementation of activities that serve as stepping stones to establish the final process. The recommendations described on the following pages focus on specific activities that will contribute to the success of the environmental management process. These recommendations will create consistency and technical defensibility in risk management programs by encouraging collaboration and communication among the installations, capitalizing on the successes of each installation's current practices and the lessons learned in various programs, and calling for innovative approaches in areas where risk management efforts could be enhanced.

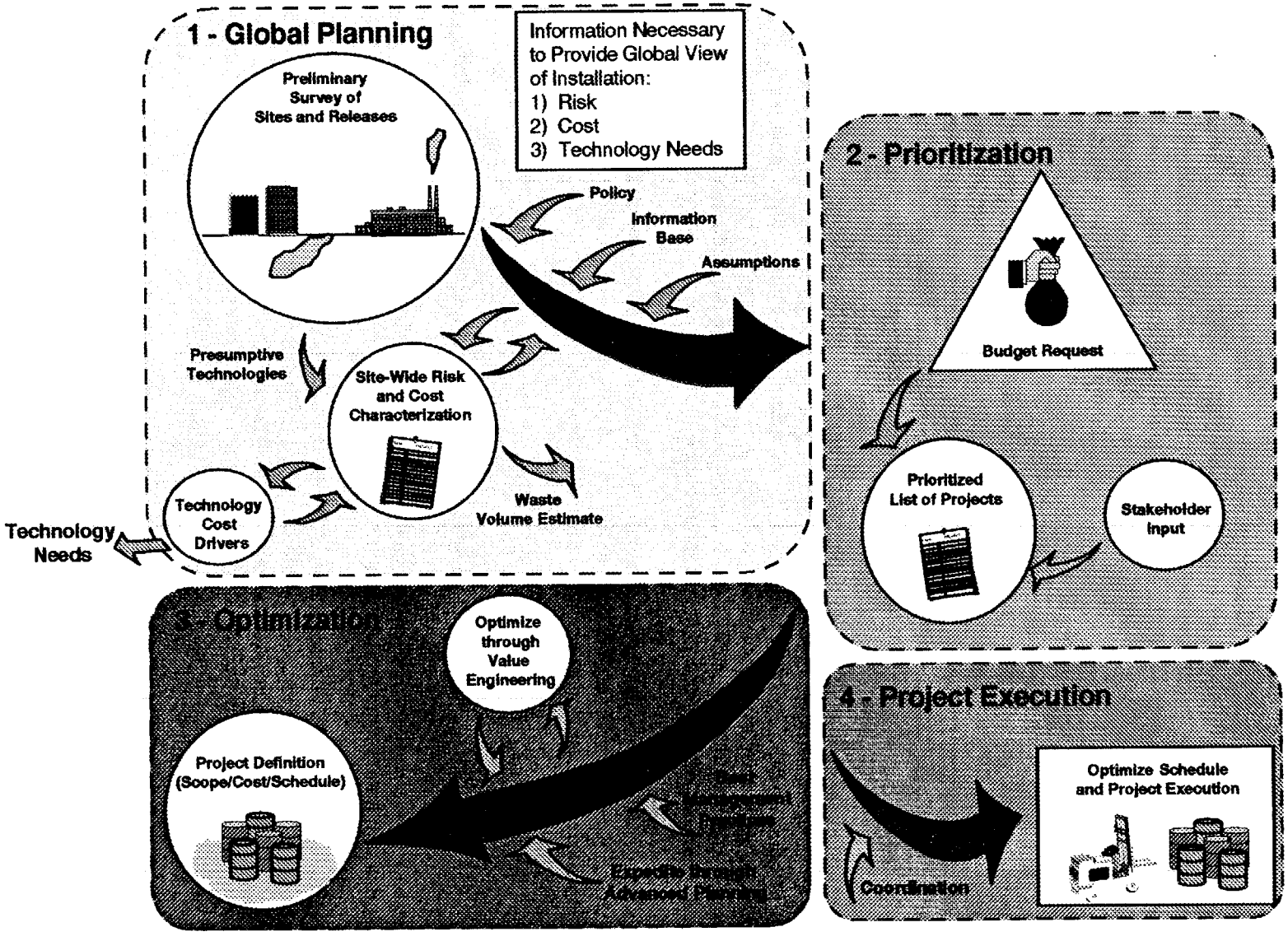


Figure 4-1. Environmental Strategic Planning

1. Perform Programmatic Analyses for Global Planning

Comprehensive global planning will determine the installation-wide risks and cost of environmental restoration activities. An installation-wide perspective of the problems, presumptive remedies, and costs associated with environmental remediation will allow DOE and its stakeholders to allocate limited resources and make remediation decisions based on defensible, global risk-benefit analyses. Moreover, the information gathered from installation-wide analyses ultimately can be used to eliminate or modify the cost drivers associated with environmental restoration.

Preliminary Survey of Installation. Before strategic planning can be used to optimize and coordinate the many activities that constitute environmental restoration, the ER program must define the scope of its problems at an installation level. To obtain this global perspective of environmental restoration problems at the installation, current and historical data should be collected and evaluated to determine sites that require further investigation and/or remediation.

Conduct Site-Wide Risk and Cost Characterizations. Based on the information obtained through the overall survey of the site, similar problems can be grouped and presumptive technologies ascertained. These presumptive remedies can be input into site-wide risk and cost models. The output from these models will provide a global perspective on technology needs, technology cost drivers, total waste volume estimate, site-wide cost to remediate the installation, and site-wide risk. The installation can use this information to establish feasible remediation goals within current and future budgets.

Address Technology Cost Drivers. Site-wide risk and cost characterization identifies the most costly remediation technologies. With this information, DOE can focus research and development activities on creating effective, less costly alternatives to these technologies, thereby further reducing remediation costs.

Suggested steps to implement this recommendation include:

- Site-wide risk assessments should be performed at each EAP installation to provide information about the types of sites and pathways contributing to health risk at each installation.
- Site-wide cost estimation should be performed at each EAP installation, tiering from the information gathered for the BEMR. In addition to helping the installations identify cost drivers within the ER program, these cost estimates can be used to examine tradeoffs between risk and cost if they are presented at the same level of detail and based on the same assumptions as the site-wide risk assessment.
- The results of the site-wide risk assessments should be used as input to other programmatic analyses such as waste volume estimating. Because the required risk reduction should determine volumes of waste to be generated during remediation, the current estimating systems should be modified to incorporate risk-based estimating methods. Such systems are useful to decision makers because they can be used to evaluate the impacts on waste volumes from remediating to different risk levels. Methods developed for the sitewide risk assessments can be adapted for use in risk-based waste volume forecasting methods.

2. Mandate Early Use of a Multi-Attribute Prioritization System

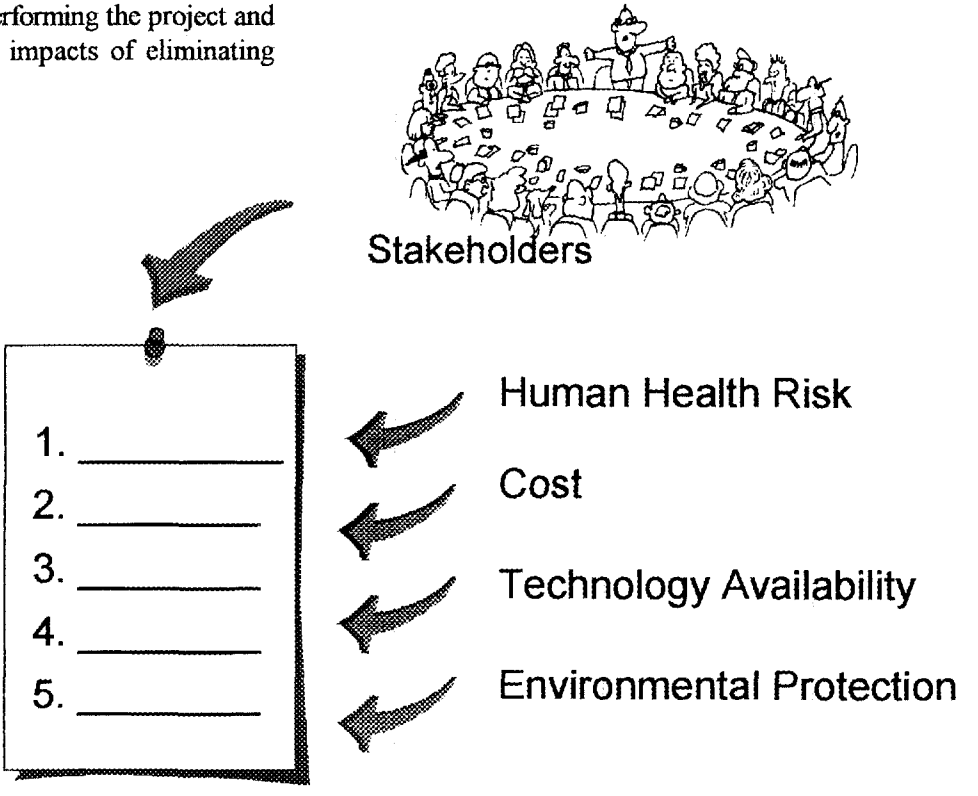
Installation-wide prioritization is the most effective method to ensure that limited resources are used effectively to achieve the most risk reduction. When it is implemented at the beginning of the environmental management process, prioritization enables stakeholders and DOE to determine the most effective sequence for site remediation. In addition, multi-attribute prioritization is a technically defensible tool to use for re-negotiating risk-based compliance agreements with regulators.

Prioritization should occur on an installation-wide basis. As an effective indicator of where to direct limited resources, prioritization of ER projects should occur foremost on an installation-wide basis, and stakeholders must be active participants in an annual prioritization exercise. Prioritization should be a comprehensive evaluation of all potential projects, including D&D, ER, and WM.

Multi-Attribute Prioritization Systems are the most effective model. For larger installations, the best prioritization system is a multi-attribute utility model, which evaluates many categories of environmental management including:

- public health and environmental protection,
- worker safety,
- stakeholder input,
- technology availability, and
- cost and operational performance impacts.

Multi-attribute prioritization illustrates the benefits of completing a project by showing the positive impacts of performing the project and the negative impacts of eliminating the project.



Suggested steps to implement this recommendation:

- A standard multi-attribute methodology to prioritize sites annually at the installation level should be developed. Regulatory compliance should be included as an attribute, and project rankings should be generated both accounting for the impacts with and without this attribute. This will provide ER managers a tool to illustrate the difference between risk-based rankings and rankings influenced by regulatory compliance.

- A technical exchange workshop and training session should be held to familiarize personnel at the EAP installations with multi-attribute prioritization models. Part of the workshop should focus on developing a prioritization model that addresses the unique needs of D&D facilities.

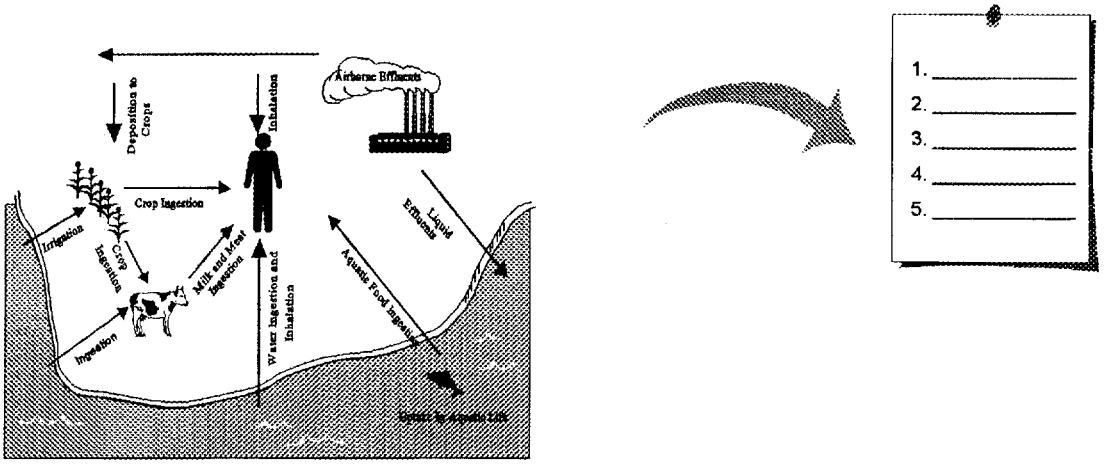
- After the standard methodology is developed, prioritization should be performed annually to account for the shifting priorities of projects and re-evaluate the efficacy of each project as it progresses. Stakeholders are an integral part of this annual exercise and should be present.

3. Use Site-Wide Risk Assessments as Input into Prioritization

The EAP installations are committed to reducing the human health risks posed by their hazardous waste sites. Cost-effective risk reduction can be expedited by performing site-wide risk assessments, which should be an integral part of programmatic planning analyses. Using the quantitative risk results from these assessments as input into prioritization will ensure the consistency and accuracy of the human health component of prioritization and will provide a defensible means to ensure cost-effective risk reduction.

Conduct Site-Wide Risk Assessments. Site-wide risk assessments are an asset to the ER planning process since these assessments can provide consistent, quantitative risk estimates for all sites, despite the lack of detailed site data available at many sites. In addition, the assessment will provide an indication of which operable units are the primary sources of contamination at an installation, identification of those sites that pose the greatest relative risk to the public, and a means for decision makers to determine the most effective order in which to perform site characterization and detailed CERCLA risk assessments across the installation.

Use Results from Site-Wide Risk Assessments as Input to Prioritization. Human health risk is an important component of a multi-attribute prioritization system. Using the results from site-wide risk assessments as input into this system will provide consistent and reliable human health risk estimates for input into the human health component. In addition, the site-wide risk results provide quantitative risk input rather than the previous qualitative, subjective input of project managers.



Suggested steps to implement the use of site-wide risk assessments:

- Each EAP installation should use the results of the site-wide risk assessments as input into the human health risk components of their multi-attribute prioritization systems.
- Site-wide risk assessors should collaborate with prioritization teams to ensure that the prioritization teams are provided with accurate site-wide risk assessment information.

- DOE should work with its stakeholders to reach consensus on the site-wide risk assessment methodology. The results of the assessments should then be shared with the stakeholders, who will consider them as part of the prioritization process.

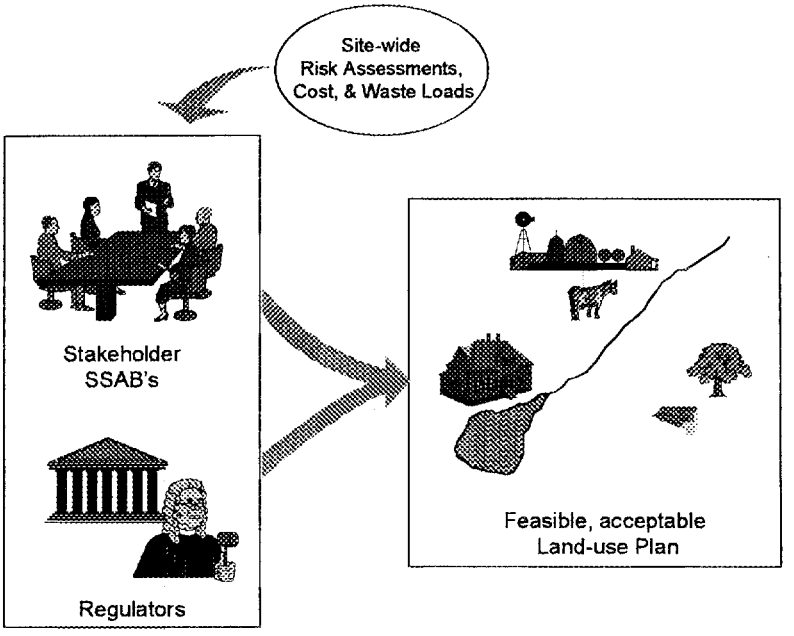
4. Expedite Development of Feasible Installation Land Use Plans

Land use decisions dramatically affect environmental management issues, including establishment of clean-up goals and estimation of remediation costs, magnitude of health risks to potential users of the land, and volumes of waste that will be generated by remediation. EAP installations can take several actions to ensure the development of feasible, acceptable land use plans.

Factor Results of Programmatic Analysis into Land Use Planning. Programmatic planning analyses can be used to determine the feasibility of various land use options. Risk and cost impacts from various land uses should be factored in the land use decision. Site-wide risk assessments should be used as early input into the land use planning process to facilitate land use selection and establish consistency between site-specific risk assessments and land use planning. Using programmatic planning analyses to factor into land use planning decisions will expedite the land use decision-making process and allow decision makers to make more informed, realistic land use decisions.

Revisit Completed Risk Assessments. If site-wide assessments and subsequent land use plans differ from risk assessments that have been completed, these risk assessments may need to be revisited to ensure that sound decisions will be made based on defensible assessments. Although redoing risk assessments entails extra work, the benefits of sound results based on presumptive remedies and land use consensus far outweigh the time required to rework the assessments.

Actively Involve Stakeholders in Land Use Planning. Since land use planning influences every aspect of the environmental management process, stakeholders should play a primary role in the iterative process of developing feasible land use plans for EAP installations. Site-Specific Advisory Boards should be used as a vehicle for stakeholder involvement, and risk and cost results from the programmatic analyses should be channeled through the board. SSAB members will then be able to use this planning information to choose between feasible, realistic land use options, with a better understanding of all the tradeoffs involved.



Suggested Steps to Implement Expedited Development of Land Use Options:

- EAP installations should collaborate with each other and other DOE programs to draw from successful land use planning experiences and determine whether similar decisions can expedite land use decisions and remediation.

- Stakeholders should be involved in land use decisions early in the process, and installations should share programmatic planning information with the stakeholders (via the SSABs) to inform the stakeholders about feasible alternatives and tradeoffs (e.g., waste volumes generated by remediation to various risk levels; costs; risk reduction levels). The EAP installations are, for the most part, already involving stakeholders in land use decisions; however, strategic planning information needs to be made available so they can make informed decisions.

- EAP should use risk and cost results from programmatic planning analyses to determine the feasibility of various land use options. Site-wide risk assessments should be used as early input into the land use planning process to aid land use selection at the local level. Results from the site-wide risk assessments should then be used to negotiate with the regulators limited, feasible land use scenarios to be evaluated in detailed site-specific risk assessments.

- EAP should use land use planning decisions as input to help site managers, regulators, and stakeholders select presumptive remedies for sites, choose feasible technologies, and determine remediation goals and clean-up standards.

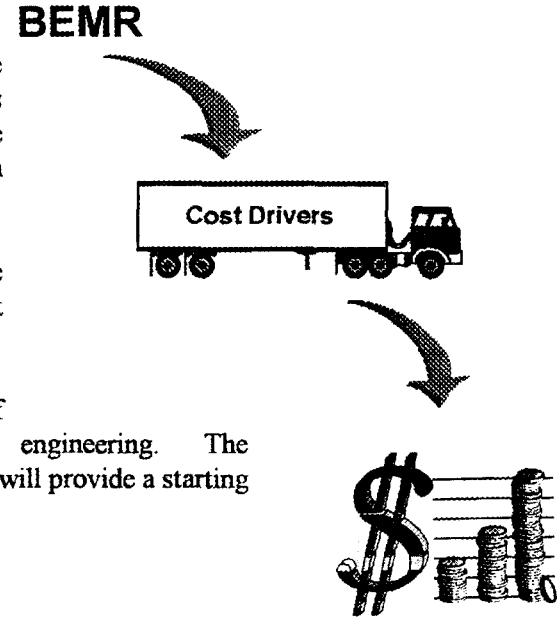
5. Tier from BEMR to Identify ER Cost Drivers

The objective of the BEMR is to provide DOE HQ with an estimate of the total cost of implementing the DOE EM program complex-wide. Information derived from the BEMR exercise can be used at the installation level for consistent installation-wide planning. By following some key initiatives, the EAP installations can tier from the BEMR and improve installation-wide planning efforts.

Analyze BEMR Information. EAP should analyze the installation and project-specific information used to generate the "rolled-up" cost estimates in the BEMR to identify the top cost-driving projects at FEMP, ORR, and SRS. BEMR estimates may need to be adjusted based on new information and subsequent cost projection changes.

Identify Cost Drivers at Installation. Each installation should investigate the cost-driving projects on a project-by-project basis to determine which activities incur the most cost within each project. Identifying cost-driving activities will pinpoint the technologies or remedies driving the cost and thereby indicate where alternative technologies are needed or where value engineering should be applied to redesign the technologies to achieve cost reductions.

Suggested Steps to Implement Tiering from BEMR:



- Obtain BEMR cost estimates for each of the three EAP installations. From this information, determine the projects and the associated activities driving the costs at each installation.
- Alternative technology solutions should be researched for the cost-driving activities at the installations.
- Initiate the evaluation and redesign of projects using the principles of value engineering. The identification of cost-drivers and alternatives will provide a starting point for the engineering study.

6. Develop a Value Engineering Focus

The escalation of environmental restoration costs represents a dilemma to DOE in the current climate of decreasing budgets. To maintain effective progress toward DOE's clean-up goals and protection of human health despite its limited resources, EAP installations need to actively implement value engineering throughout the ER planning process. Value engineering has proven to reduce project costs significantly and is vital for a successful environmental management process.

Identification of Major Cost Drivers. Identification of cost drivers can be done on an installation-wide basis by tiering from the Baseline Environmental Management Report, as described in recommendation 5. The identification of alternative technologies for the cost-drivers will provide a starting point for the value engineering study.

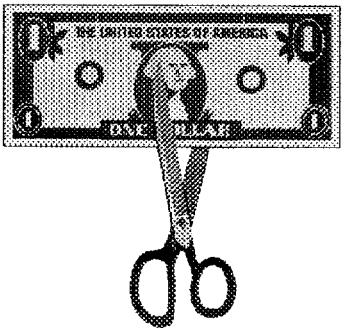
Idenfication of Alternatives for Project Functions. The value engineering process proceeds by identifying the functions required to meet project goals. By breaking the project into these basic functions, areas where bottlenecks occur or where a project's efficiency and effectiveness declines are identified.

Redesigned Projects to Reduce Costs. After evaluating the basic functions and their associated costs, value engineers develop alternatives based on their potential for project improvement and cost reduction. The project is then redesigned to eliminate the project's weaknesses, bolster its strengths, and reduce the costs by elimating unnecessary steps and streamlining the project's scope.

Create VE Database. As part of each installation's VE program, the installation should create a database of the ER project costs and VE savings. This database will serve as a valuable reference that VE teams can use to learn from prior VE successes and will provide evidence to Congress and stakeholders of DOE efforts to achieve cost savings. Because a VE database will illustrate the specific VE suggestions that have generated cost avoidances, referencing the database during new VE efforts will streamline the process by reducing the alternatives analysis required for projects similar to those performed in the past.

Suggested Steps to Develop a Value Engineering Focus:

- Value engineering should be required for each project, and each installation should develop a centralized core VE staff responsible for conducting VE and tracking cost avoidance successes.



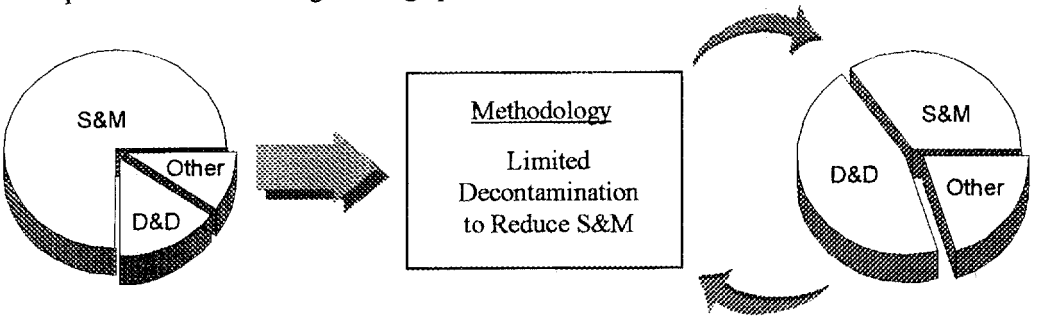
- EAP installations should draw from Hanford's experience and collaborate with PNL's Strategic Transition Initiative Division to develop a similar VE database of projects and savings. Project managers performing the initial design cost estimates and VE teams should use the database as a reference tool.

- EAP installations should obtain information from other DOE programs to institute standardized methodologies and procedures. Technical exchange workshops are one possible forum for collaboration among installations on VE methods and lessons learned.

7. Expedite D&D Strategies

The EAP installations have many buildings currently maintained as surplus. Although these buildings presently pose minimal risk to the public, as they await D&D, they continue to deteriorate, increasing the potential for structural failure and contaminant release. The D&D programs can institute several actions that will reduce this potential and facilitate the effective distribution of funding and resources.

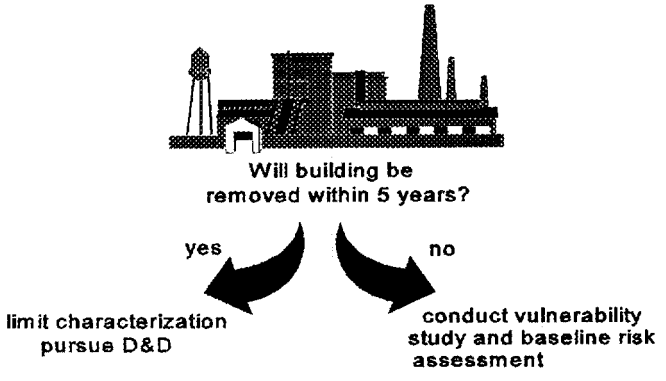
Develop Methodology to Effectively Allocate Funds. To accomplish constructive work within the tightening D&D budget, DOE needs a D&D approach that is biased for action yet effectively balances funds between assessment, restoration, and long-term S&M. Frequently, the D&D program relegates buildings to long-term S&M rather than allocating resources to deactivate and demolish buildings that pose little risk. Long-term S&M costs can potentially outweigh the one-time cost to D&D a building. Implementing a methodology to determine the most beneficial allocation of funds will initiate the process of transferring funding spent on S&M to actual D&D.



Limit Characterization and Assessment. Characterization and assessment has proven to be one of the most expensive and resource consuming activities during the EPA CERCLA process. Facilities, however, have unique needs based on risk (both human health and safety) and future use. To eliminate the likelihood of expenditures of limited funding and valuable resources on unnecessary characterization and assessment, each installation's D&D program should examine its suite of surplus and future surplus buildings and divide the buildings into two groups:

(1) those buildings that will be removed in the near future (e.g., within five years), and

(2) those buildings that will be reused or removed later (e.g., after five years).



DOE should proactively pursue D&D on buildings slated to be removed in the near-term by limiting characterization and assessment to only the extent necessary for human safety during D&D. For the buildings in group two, DOE should conduct vulnerability studies in tandem with risk assessments. Vulnerability studies focus on evaluating the physical integrity of the structures and related health and safety issues, and risk assessments predict adverse human health consequences from potential contaminant releases.

Implement Material Reuse Program. EAP should coordinate waste minimization programs with the D&D program to develop innovative methods to recycle and reuse contaminated materials from D&D buildings. Costs saved from the recycling and reuse of materials from D&D activities can then be reinvested into the D&D program to perform further D&D activities or support S&M costs.

Suggested Steps to Implement Expedited D&D Strategy:

- EAP installations should compare the tradeoffs (e.g., risk, cost, schedule) between ER and D&D projects and consider these tradeoffs when prioritizing and allocating funds for projects. Performing limited D&D projects rather than full-scale D&D can lower future S&M costs. EAP should compare risk and cost tradeoffs between levels of D&D and S&M.

- Learning from EM-60's methods, EAP installations should evaluate ways to reduce the enormous S&M costs, freeing money for D&D activities and saving money in the long-term.

- Each installation should determine which buildings will most likely be removed in the near future (five years). For those buildings to be removed in the near future, characterization and assessment should be limited to only the amount necessary for maintaining worker safety.

- Using the vulnerability study approach developed by EH, EAP should conduct vulnerability studies on those buildings not slated for near-term D&D.

- EAP should conduct risk assessments for those buildings not slated for near-term D&D. DOE should immediately initiate collaboration with regulators to reach consensus on an acceptable D&D risk assessment methodology before the large scale implementation of D&D practices.

- A methodology for D&D baseline risk assessments should be developed and used in discussions with regulators on D&D risk assessment requirements. Because the level of facility characterization varies dramatically, the baseline risk assessment methodology should accommodate different levels of facility characterization to minimize additional expenditures for characterization.

- EAP should integrate the installations' waste minimization programs with the D&D program to develop a plan for the reuse of contaminated metals both outside and within the D&D program. The end use of buildings will influence this issue and should be considered when developing a method for the reuse of contaminated metals within the D&D program.

8. Expedite ER Process by Defining Presumptive Remedies

Effective and efficient project planning can be streamlined by the development of presumptive remedies. Presumptive remedies not only feed realistic technology scenarios into the site-wide risk and cost models but also allow the program and project managers to focus on their remediation approach in the early project planning stages.

Group Similar Sites from Installation Survey. Using the information provided by site-wide programmatic analyses, EAP should survey its ER problems at SRS, FEMP, and ORR and categorize similar problems for which presumptive remedies are feasible (realizing that EAP will have many unique problems, or problems for which presumptive remedies are unavailable).

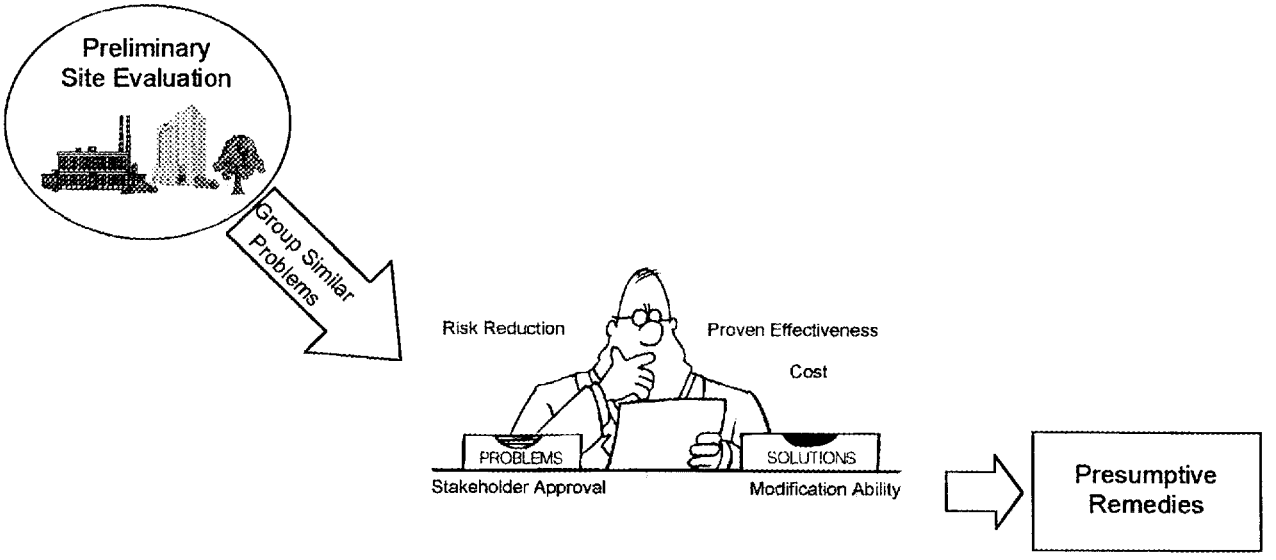
Develop Potential Presumptive Remedies. For each grouping of ER problems, EAP should identify a list of potential presumptive remedies based upon:

- achievable risk reduction,
- proven effectiveness,
- implementation cost, and
- ability to be modified for specific site conditions.

Obtain Concurrence from Stakeholders on the Remedies. After the installations have a probable list of presumptive remedies, collaboration should be initiated with stakeholders to negotiate the acceptable presumptive remedies. Once consensus is reached on presumptive remedies for each category of problem amenable to the presumptive remedy approach, EAP should generate guidance documents describing the presumptive remedies and the criteria and approach used to achieve concurrence on their use. EAP should share this guidance across the DOE Complex to minimize remedial alternative analysis and expedite restoration.

Suggested Steps to Define Presumptive Remedies:

- Obtain brief descriptions of all ER problems at each EAP installation. Group the sites based



on common characteristics such as site type, contaminated media, and principal contaminants.

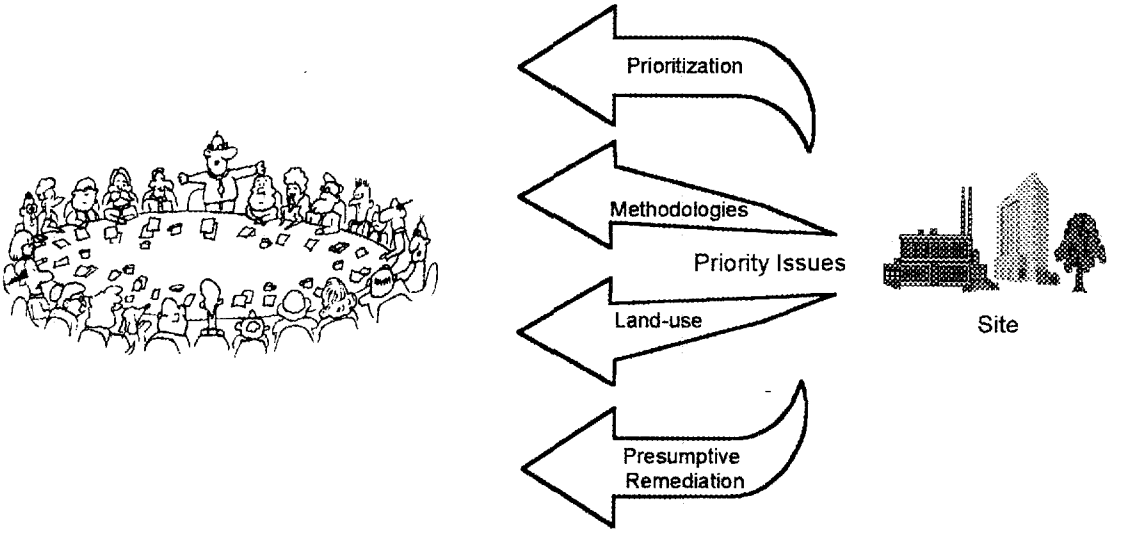
- Study the presumptive remedy approaches developed by EPA and the Air Force (e.g., Eglin AFB) to assist in deriving a menu of potential presumptive remedies and criteria for selecting a presumptive remedy.

- Determine which of the site categories developed in step 1 are viable for a presumptive remedy. From the menu of remedies, develop with stakeholder interaction a tentative list of preferred presumptive remedies for each category of sites.

9. Optimize Stakeholder Involvement in the Decision-Making Process

Although DOE has instituted a culture change that seeks to form partnerships with stakeholders so that they work together to reach consensus on common goals, the Department's eagerness to institute this change has resulted in stakeholders being overwhelmed by the mountain of issues they are asked to address.

Prioritize Stakeholder Involvement. While many regulations require limited public involvement in the form of a public comment period or public meetings at specific stages of certain projects, early and continued stakeholder involvement on **priority** issues is crucial to uphold DOE's strides toward gaining public confidence and ensure acceptable and successful decision-making. Site-Specific Advisory Boards (SSABs) or stakeholder committees should be encouraged to provide input in the early stages of project planning and prioritization, where the bulk of funding allocation decisions are made. Then, DOE should assist the SSABs in prioritizing their involvement so that the SSABs focus on the most important issues rather than being overwhelmed by responding to every issue.



This recommendation can be implemented by the following steps:

- Budgetary constraints should be shared with stakeholders so that they are able to make judgements and requests given the limited resources available.

- EAP installations should assist the SSABs in prioritizing the issues they are asked to address so the SSABs can remain effective. Currently, SSABs are asked to provide input to DOE and the sites on scores of issues, with no guidance on which to address first or which are highest priority. Some of the higher priority issues might include the following:

  -Site-wide prioritization, where funding decisions are formed — stakeholders should be represented on prioritization panels or teams
  -Land use decisions
  -D&D issues, including land use, prioritization, and end-use of buildings
  -Identifying and selecting presumptive remedies for a site

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