DOE/LLW-115
PREDECISIONAL DRAFT

OPERATIONAL CONCEPTS
FOR THE ENVIRONMENTAL RESTORATION
AND WASTE MANAGEMENT
CONFIGURATION STUDY

OPERATIONAL CONCEPTS TEAM
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December 1990

MASTER

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Prepared for the
U.S. Department of Energy
by the
Radioactive Waste Technical Support Program
and the Operational Concepts Team
Idaho National Engineering Laboratory
Under DOE Contract No. DE-AC07-76ID01570

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ACKNOWLEDGMENTS

Throughout the conduct of the Operational Concepts Study, the team received valuable assistance and advice from many government contractors, private organizations, and individuals. The study benefitted from their participation, and the Team is indebted to them for their time and counsel.

The Team 3 participants have donated their time and expertise toward ensuring the success of the study. They have generously provided their time and expertise during the Team 3 working group meetings and in the report review process.

Staff from Battelle - Pacific Northwest Laboratories (PNL) provided technical and analytical assistance. The services received were valuable in providing a basis for the Operational Concepts Report and supported the nonquantitative decision methodology used by the Team. PNL support included Cynthia Abrams, Jon M. Corey, Larry Levine, and William G. Stillwell.

Special thanks go to Harold Heydt of EG&G, Idaho Inc., and Jon M. Corey of PNL for facilitating the Operational Concepts workshops. The workshops were successful in providing the information necessary to complete the study.

Several other organizations and individuals in both the public and private sectors gave generously of their time and expertise in reviewing and commenting on the information presented in the study. These reviewers included H. Elliot Chakoff, Richard Hames, Paul Hendrickson, Emmett Moore, and Mark Triplett. We have tried to acknowledge all of the contributors to this report, and we regret any inadvertent omissions.

EXECUTIVE SUMMARY

The U.S. Department of Energy (DOE) Office of Environmental Restoration and Waste Management (EM) has taken the initiative to modernize all DOE waste management complexes, many of which are operated by independent contractors. DOE's proposed integrated environmental restoration and waste management program is to provide a broad, systematic approach to addressing cleanup activities and waste management practices. The Department is committed to ensuring that potential risks to human health and the environment from the cleanup of contamination resulting from past operations and from future waste management activities are at safe levels.

Through the EM, DOE has initiated a planning process in anticipation of upgrading all DOE waste management operations and facilities. The EM Configuration Study, which is a deciding factor in this process, examines four specific areas: (1) planning considerations, (2) system configuration, (3) operational concepts, and (4) resource assessments. Each area is addressed by a different team (Teams 1 through 4, respectively), whose members are producing a report on a particular aspect of the overall plan.

The objective of the Operational Concepts Team 3 study is to investigate, identify, define, and evaluate alternative ways to manage DOE waste management facilities, while taking into consideration the information gathered by the other EM Configuration teams. This report provides information and criteria for evaluating the relative effectiveness and efficiency of various organizational alternatives that can be used to operate and manage DOE waste facilities. The intent of this report is not to select one best management alternative but rather to provide recommendations, conclusions, and background information from which decisions will be made at a future date.

Team 3 used a systematic approach to investigate, identify, define, and evaluate alternative configurations for managing DOE's wastes. Team

participants were strategically selected to provide a broad range of expertise in waste management. The Team gathered in working group sessions to exchange information on the management of DOE wastes.

The Team identified and defined four alternative ownership and management configurations. These organizational structures may be distinguished from one another by differences in ownership, framework, legal definition, and management modes. An endless variety of specific substructures can be created under each of these broad alternatives. For the purpose of conducting an effective decision analysis process, it is necessary to evaluate a limited number of general categories. However, due to the wide variations possible, these alternatives should be viewed as general, as opposed to specific, stand-apart, models.

Following are the major ownership and management configurations identified by Team 3:

- (1) *GOGO* - Government-owned, government-operated
- (2) *GOCO* - Government-owned, contractor-operated
- (3) *COCO* - Contractor-owned, contractor-operated
- (4) *P/P* - Public/private combination

The Team then identified, categorized, and defined evaluation parameters or criteria that would be useful in the evaluation of the management configurations. The criteria were categorized into three groupings: (1) discriminatory, (2) essential but not discriminatory and (3) considered but not discriminatory. The most critical criteria by priority ranking and by independence, not performed at the same level among all management types, were categorized as discriminatory. The following is the prioritized list of discriminatory criteria, which were then used to evaluate the perceived performance of the four management alternatives.

Ability of an organization to:

1. Manage liability by balancing responsibility and risk
2. Respond to political/public issues
3. Perform ill-defined, high-risk, or changing mission
4. Be cost effective
5. Apply technology
6. Apply capital funds
7. Control personnel
8. Ensure a reliable continuous operation
9. Apply operating funds
10. Perform procurement in a flexible and timely manner.

Recommendations were formulated by Team 3 in a subgroup evaluation of the 10 criteria against specific management options. During the evaluation, a comparative analysis of functional, waste type, and process differences for each of the management options was performed using the 10 discriminatory evaluation criteria and other relevant issues. To identify functional differences, DOE facilities were clustered into three major function categories: Production Facilities, Environmental Restoration Sites, and National Research Laboratories. Each of these facilities was further categorized by the types of waste handled at the site (HLW, TUW, LLW, HZW, ER and RHW) and process (treatment, storage, and disposal). The Team 3 recommendations indicated that functional differences were irrelevant in

determining the best management option; a waste has the same recommended management structure independent of where the waste was generated. Recommendations were based on actual waste management requirements at the different facilities. The actual waste management requirements used to derive the recommendations were process and waste type oriented.

From the recommendations formulated in the Team 3 subgroup evaluation process, management configuration conclusions were formulated. Table ES-1 summarizes the conclusions derived from the Team 3 recommendations.

Table ES-1. Management Configuration Conclusions			
Waste Type	Treatment	Storage	Disposal
HLW	GOCO	GOCO	GOCO
TUW	GOCO	GOCO	GOCO
LLW	COCO	COCO	GOCO
HZW	COCO	COCO	COCO
ER	COCO	COCO	GOCO
RHW	COCO	COCO	COCO

The report concludes with some alternative issues to be considered while reviewing these recommendations. It is recognized that no one configuration option can work at all DOE waste management facilities but rather a composite of the above recommendations. It is also recognized that some key discriminating criteria such as liability, cost, and public perception may outweigh all other criteria, thereby determining the final configuration to be implemented.

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ACRONYMS

ASDP	Assistant Secretary for Defense Programs
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COCO	Contractor-Owned Contractor-Operated
DEAR	Department of Energy Acquisition Regulation (DEAR)
DOE	U.S. Department of Energy
DP	Office of Defense Programs
EM	Office of Environmental restoration and Waste Management
ER	Environmental restoration
ERMC	Environmental Restoration Management Contractor
ES&H	Environment, safety, and health
FAR	Federal Acquisition Regulation
GAO	General Accounting Office
GOCO	Government-owned contractor-operated
GOGO	Government-owned government-operated
HLW	High-level waste
HZW	Hazardous waste (nonradioactive)
INEL	Idaho National Engineering Laboratory
IMC	Integration Management Contractor
IPP	Institutional Planning Process
LLW	Low-level waste
M&O	Management and operating
P/P	Public/private combination
PRP	Potentially responsible party
R&D	Research and development

RCRA	Resource Conservation and Recovery Act
RHW	Radioactive hazardous mixed waste
ROI	Return on investment
RPR	Revised proposed rulemaking
T/S/D	Treatment/storage/disposal
TUW	Transuranic waste
WIPP	Waste Isolation Pilot Plant

1. INTRODUCTION

1.1 Background

Proper handling of radioactive waste, radioactive mixed waste, and hazardous waste is a national concern that becomes greater each year. In response to this concern, Congress passed the Resource Conservation and Recovery Act (RCRA) in 1976; the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) in 1980; and the Superfund Amendments and Reauthorization Act (SARA) in 1986 to regulate hazardous waste. This legislation, along with legislation regulating radioactive waste, demonstrates the commitment to clean up and manage such substances.

Within this larger context and in order to come into compliance with environmental regulations and to complete environmental restoration by 2019, the U.S. Department of Energy (DOE) Office of Environmental Restoration and Waste Management (EM) has taken the initiative to modernize all DOE waste management complexes, many of which are operated by independent contractors. DOE's proposed integrated environmental restoration and waste management program is to provide a broad, systematic approach to addressing cleanup activities and waste management practices. The Department is committed to ensuring that potential risks to human health and the environment from the cleanup of contamination resulting from past operations and from future waste management activities are at safe levels. Two key challenges exist: First, implement an efficient and effective waste management program for all DOE facilities currently dealing with waste management. Second, determine remedial action for facilities no longer in operation by examining if previously generated waste was treated, stored, and disposed of in an environmentally sound manner that will stand up to current federal and state regulations, and to public scrutiny. Proper remediation of the previously generated wastes may actually prove to be the greater of these two challenges.

Through the EM, DOE has initiated a planning process in anticipation of upgrading all DOE waste management operations and facilities. The EM Configuration Study, which is a deciding factor in this process, examined four specific areas: (1) planning considerations, (2) system configuration, (3) operational concepts, and (4) resource assessments. Each area is addressed by a different team, (Teams 1 through 4, respectively), whose members are producing a report on a particular aspect of the overall plan. The overall EM Configuration Study deals only with the treatment, storage, and disposal (TSD) of radioactive waste, radioactive mixed waste, and hazardous waste. Waste transportation issues, though important, are not a primary concern in this Team 3 study, but they will be addressed as an overall factor in the success of any related program or management configuration.

1.2 Purpose

The purpose of this report is to document the Team 3 investigation, identification, definition, and evaluation of alternative ways to manage DOE waste management facilities while taking into consideration the information gathered by the other EM Configuration teams. This report also provides information and criteria for evaluating the relative effectiveness and efficiency of various organizational alternatives that can be used to operate and manage DOE waste facilities. DOE retains ownership of the waste produced at these waste management facilities. The intent of this report is not to select one best management alternative but rather to provide recommendations and background information from which decisions will be made at a future date.

1.3 Team 3 Process

Team 3 used a systematic approach to investigate, identify, define and evaluate alternative configurations for managing DOE's wastes. The alternatives addressed the operation and management of DOE waste management facilities.

Team 3 participants were strategically selected to provide a broad range of expertise in the area of waste management. The Team represents both government and private sectors and is made up of high-level managers with current and past work experience in waste management organizations and companies. There are ten members from private industry, eight from government contractor and subcontractor organizations, and three government employees.

The team gathered in working group sessions to exchange information on the management of DOE wastes. These workshops were structured to obtain the specific information used in arriving at the Team 3 recommendations and conclusions documented in this report.

During the course of the Team 3 meetings, the members participated in group and subgroup exercises, which were led by specialists in facilitating information gathering sessions. Information gathered included the listing and defining of alternate ownership and management configurations, the categorized listing and defining of criteria useful in evaluating management configurations, and the evaluative analysis of each management configuration.

As documented in the Recommendations and Conclusions for Configuration Management Options section of the report, the information discussed in the meetings was analyzed by the Team to determine impacts on management structure based on operational function, waste type, and waste process. The results of this analysis were summarized and are documented in Section 4.

1.4 Assumptions

The following are primary assumptions of the Environmental Restoration and Waste Management (EM) Configuration Study:

- The planning horizon for the study is the year 2020
- EM will be responsible for managing all DOE wastes

- Defense Programs operations will continue to be a principal source of DOE wastes
- Environmental Restoration operations will become a significant new source of DOE wastes
- Defense Programs reconfiguration strategies will have a significant impact on EM strategic alternatives
- Environmental Restoration and Waste Management system configuration alternatives are required as input for the EM Programmatic Environmental Impact Statement.

The following assumptions have been made in the production of this report:

- No single solution or system can apply to all DOE facilities. A blend of management strategies addressing both efficiency and effectiveness for waste management systems is needed.
- The information presented herein is process and criteria oriented to enhance future analyses and decisionmaking. The study's primary focus is to provide planning guidance rather than specific implementation instructions.
- All findings will be oriented toward a long-term, overall management strategy.
- This study is to be an iterative process; additional data may be integrated as deemed applicable.

1.5 Report Organization

This report begins by examining and reviewing current DOE facilities which treat, store, and dispose of waste throughout the country. A brief description of the location and operations management is included. For additional information on the general function of each site, see Appendix A. The different types of wastes produced at these complexes are identified in Appendix B. For consistency, this report will use the terminology and acronyms for waste types that were identified in the Team 2 report. The waste type acronyms are as follows:

- HLW - High-level waste
- TUW - Transuranic waste
- LLW - Low-level waste
- HZW - Hazardous waste
- RHW - Radioactive hazardous mixed waste
- ER - Environmental restoration waste

Section 2 defines four major ownership and management configurations addressed by Team 3: government-owned government-operated (GOGO), government-owned contractor-operated (GOCO), contractor-owned contractor-operated (COCO) and a combination of public and private entities (P/P). An overview outlines DOE's current reliance on the GOCO, configuration and describes which tools DOE uses to oversee and manage these GOCO facilities. Tables 2 and 3 present the major DOE sites responsible for treatment, storage, and disposal, their locations and management types.

Section 3 documents criteria used to evaluate the four different management options previously identified. These criteria include discriminatory criteria, essential criteria, and nondiscriminatory criteria.

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Section 4 provides the recommendations and conclusions formulated in the Team 3 process. The conclusions are presented by waste type (HLW, TUV, LLW, HZW, ER and RHW) and waste process (treatment, storage, and disposal).

The final section, "Summary and Additional Considerations"; concludes the report and presents additional issues that should be addressed when considering management options.

2. MANAGEMENT STRATEGIES AND OWNERSHIP CONFIGURATIONS

This section encapsulates the four major ownership configurations addressed by Team 3. All of these configurations currently exist throughout the public and private sectors. Each of these management options is defined and evaluated in Section 4. A listing and discussion of the current DOE waste management facilities and their ownership status are also noted. The section concludes with an analysis of the management tools currently implemented by DOE to oversee and manage its facilities.

2.1 Four Major Ownership Configurations

Organizational structures may be distinguished from one another by differences in ownership, framework, legal definitions, and management modes. An endless variety of specific substructures can be created under each of these broad categories, but for the purpose of conducting an effective decision analysis process, it was necessary to evaluate a limited number of general categories. However, because of the wide range of possible variations, these alternatives should be viewed as general and not specific, stand-apart models.

The major ownership configurations under consideration are (1) *GOGO* (government-owned government-operated), (2) *GOCO* (government-owned contractor-operated), (3) *COCO* (contractor-owned contractor-operated), and (4) *P/P* (public/private combination).

2.1.1 GOGO - Government-Owned Government-Operated

The GOGO structure enables the federal government to implement a corporate organizational structure in which the government owns the land and facilities. The government also assumes financial and liability risk. The government sets the budget and determines all internal processes for operations, personnel, and procurement. Effectiveness, as opposed to profit,

is a key driver. Examples of this configuration would be the Aberdeen Proving Ground, Naval Shipyards, and the U.S. Postal Service. Generally speaking, the corporation is created by legislation; therefore, active congressional oversight is inherent.

2.1.2 GOCO - Government-Owned Contractor-Operated

The GOCO structure is designed to provide government oversight of contractor operations. Customarily, the government owns the land and the facilities on a GOCO structure and thus assumes the financial and an agreed-upon portion of the liability risk. The government sets the budget and maintains responsibility for the program guidance and technical direction, including the procurement process. The contractor is responsible for the actual operation and personnel management of the facilities. Staff members are employees of the contractor. Profit is a consideration factor for the contractor. Congressional involvement is possible.

2.1.3 COCO - Contractor-Owned Contractor-Operated

The COCO structure consists of a private corporation both owning and operating the facility. The corporation may own or lease the land from the government and assumes the financial and liability risks. The corporation also sets the budget and determines internal operational, personnel, and procurement processes. Profit is an important factor for the contractor. The corporation organization and budget are similar to those typically found in the private sector. The private organization could be either existing or created specifically for the purpose of environmental restoration and waste management. It is possible that several such entities could either work together, creating a monopoly in particular regions, or compete with one another.

A variation on this theme is referred to as a chartered private corporation. The chartered private corporation is a facility originally built and owned by the government and then transferred to private ownership, such as the Communications Satellite Corporation. The government originally owns and operates the chartered private corporation and gradually transfers it to private hands or creates it and turns it over immediately. Some degree of governmental oversight is generally maintained through legislation. This type of corporation is free to set policies as it wishes without approval or oversight by the government, except for legislation that would mandate certain activities or procedures.

A third format is the utility-type private organization. This is an ownership/operator configuration not organizationally or operationally related to the federal government in any way. This would include a private entity such as the Ohio Valley Electric Corporation.

2.1.4 P/P - Private/Public Combination

The P/P combination structure encompasses mixed ownership, with the liability and management responsibility held by both the government and some private corporations as well. The government and corporation share ownership of the land and facilities as well as the financial and liability risk, with the corporation assuming most of the financial risk. The government and corporation also work together to set the budget and share responsibility for program guidance and technical direction, including operational, personnel, and procurement processes. An example of this type of ownership would be AMTRAC. Mixed ownership would give corporations an additional source of capital that would still be obtained from the federal budget using the controls established for the budget process. Government oversight would be significant.

Table 1 will help illustrate these categories.

Table 1. Four Major Management Configuration Categories				
	GOGO	GOCO	COCO	P/P
Own Land	Government	Government	Contractor	Share
Own Facilities	Government	Government	Contractor	Share
Assumes Liability Risk	Government	Share	Contractor	Share
Assumes Financial Risk	Government	Government	Contractor	Share
Sets Budget	Government	Government	Share	Share
Determines Process	Government	Government	Contractor	Share
Has Profit Motivator	N/A	Contractor	Contractor	Contractor

2.2 Current Management System Characteristics and History

2.2.1 Current Ownership Status

Radioactive, radioactive mixed, and hazardous wastes are currently being produced at a significant number of DOE-controlled facilities by a variety of DOE programs including Nuclear Energy Research and Development, Energy Research and Development, and Environmental Restoration and Defense Programs. The EM Configuration Study addresses these DOE facilities responsible for the treatment, storage, and disposal of wastes generated by these programs.

Table 2 is a summary representation and overview of production and T/S/D capabilities that currently exist. Operator designations and the type of management configurations utilized are also identified. Table 2 is not intended to be a conclusive listing of management configurations but rather an overview of major DOE sites. Of the DOE sites displayed, the majority are

GOCO. Contractors consist of private corporations as well as universities and sometimes multiple interests as seen in Table 3. For additional information regarding DOE waste management facilities see Appendixes A and B, as well as the Team 2 report.

Table 2. Major DOE Sites Responsible for Treatment, Storage and Disposal of Wastes

SITE NAME	LOCATION	CONTRACTOR	TYPE
Albuquerque Operations Office			
Inhalation Toxicology Research Institution	Albuquerque, New Mexico	Inhalation Toxicology Research Institute	GOCO
Kansas City Plant	Kansas City, Missouri	Allied Signal	GOCO
Los Alamos National Laboratory	Los Alamos, New Mexico	University of California	GOCO
Mound Laboratory	Miamisburg, Ohio	EG&G Applied Technologies	GOCO
Pantex Plant	Amarillo, Texas	Mason and Hanger-Silas Mason Co. Inc.	GOCO
Pinellas Plant	St. Petersburg, Florida	General Electric Co.	GOCO
Sandia National Laboratories	Albuquerque, New Mexico	AT&T Technologies, Inc.	GOCO
Sandia National Laboratories	Livermore, California	AT&T Technologies, Inc.	GOCO
Sandia National Laboratories	Tonopah, Nevada	AT&T Technologies, Inc.	GOCO
Waste Isolation Pilot Plant	Carlsbad, New Mexico	Westinghouse	GOCO
CHICAGO OPERATIONS OFFICE			
Argonne National Laboratory - West	Idaho Falls, Idaho	University of Chicago	GOCO
Argonne National Laboratory - East	Argonne, Illinois	University of Chicago	GOCO
Battelle Columbus	Columbus, Ohio	Battelle Memorial Institute	GOCO
Brookhaven National Laboratory	Upton, New York	Associated Universities, Inc.	GOCO
Fermi National Accelerator Laboratory	Batavia, Illinois	University Research Assoc. Inc.	GOCO
Princeton Plasma Physics Laboratory	Princeton, New Jersey	Princeton University	GOCO

Table 2. (continued)

SITE NAME	LOCATION	CONTRACTOR	TYPE
IDAHO OPERATIONS OFFICE			
Idaho National Engineering Laboratory (INEL)	Idaho Falls, Idaho	EG&G Idaho, Inc.	GOCO
West Valley Demonstration Project	West Valley, New York	West Valley Nuclear Services	GOCO
Grand Junction Project Office	Grand Junction, CO	Chem-Nuclear Geotech, Inc.	GOCO
NEVADA OPERATIONS OFFICE			
Nevada Test Site	Nye County, Nevada	Reynolds Electrical & Engineering Co.	GOCO
OAK RIDGE OPERATIONS OFFICE			
Ashtabula Plant	Ashtabula, Ohio	Reactive Metals, Inc.	GOCO
Feed Materials Production Center	Fernald, Ohio	Westinghouse Materials Co. of Ohio	GOCO
Oak Ridge Gaseous Diffusion Plant	Oak Ridge, Tennessee	Martin Marietta Energy Systems, Inc.	GOCO
Oak Ridge National Laboratory	Oak Ridge, Tennessee	Martin Marietta Energy Systems, Inc.	GOCO
Paducah Gaseous Diffusion Plant	Paducah, Kentucky	Martin Marietta Energy Systems, Inc.	GOCO
Portsmouth Gaseous Diffusion Plant	Portsmouth, Ohio	Martin Marietta Energy Systems, Inc.	GOCO
Y-12 Plant	Oak Ridge, Tennessee	Martin Marietta Energy Systems, Inc.	GOCO
RICHLAND OPERATIONS OFFICE			
Hanford Reservation	Richland, Washington	Westinghouse Hanford Co.	GOCO
ROCKY FLATS OPERATIONS OFFICE			
Rocky Flats Plant	Golden, Colorado	EG&G Rocky Flats	GOCO

Table 2. (continued)

SITE NAME	LOCATION	CONTRACTOR	TYPE
SAN FRANCISCO OPERATIONS OFFICE			
Lawrence Berkeley Laboratory	Berkeley, California	University of California	GOCO
Lawrence Livermore National Laboratory	Livermore, California	University of California	GOCO
Stanford Linear Accelerator	Stanford, California	Stanford University	GOCO
SAVANNAH RIVER OPERATIONS OFFICE			
Savannah River Site	Aiken, South Carolina	Westinghouse Savannah River	GOCO

Management Configuration Characteristics

SITE NAME	P/P	COCO	GOGO	GOCO	STATE	PROFIT	NOT-FOR-PROFIT	CONTRACTOR NAME
Argonne National Lab				X	X		X	University of Chicago
Ashtabula Plant				X		X		Reactive Metals Inc.
Battelle Columbus				X			X	Battelle Memorial Inst.
Brookhaven National Lab				X			X	Associated Universities, Inc.
Feed Materials Prod. Ctr.				X		X		Westinghouse Materials Co. of Ohio
Fermi National Lab				X			X	University Research Assoc.
Grand Junction Project Office				X		X		ChemNuclear Geotech, Inc.
Hanford Reservation				X		X		Westinghouse Hanford Co.
INEL				X		X		EG&G/Westinghouse
Inhalation Toxicology Research Inst.							X	Lovelace Biomedical and Environmental Research Inst.
Kansas City Plant				X		X		Allied Signal Corp.
Lawrence Berkeley Lab.				X	X		X	University of California
Lawrence Livermore Nat. Lab				X	X		X	University of California
Los Alamos National Lab				X	X		X	University of California
Mound Lab				X		X		EG&G

Table 3

Management Configuration Characteristics

SITE NAME	P/P	COCO	GOGO	GOCO	STATE	PROFIT	NOT-FOR-PROFIT	CONTRACTOR NAME
Nevada Test Site				X		X		Reynolds Elec. & Eng. Co.
Oak Ridge Gaseous Dif.				X		X		Martin Marietta Energy Sys, Inc
Oak Ridge National Lab.				X		X		Martin Marietta Energy Sys, Inc
Pacific Northwest Lab.				X			X	Battelle Memorial Institute
Paducah Gaseous Dif.				X		X		Martin Marietta Energy Sys, Inc
Pantex Plant				X		X		Manson & Hanger-Silas Mason Co.
Pinellas Plant				X		X		General Electric Co.
Portsmouth Gaseous Dif.				X		X		Martin Marietta Energy Sys, Inc
Princeton Plasma Physics Lab				X			X	Princeton University
Rocky Flats Plant				X		X		EG&G Rocky Flats
Sandia National Laboratory				X			X	AT&T, Inc.
Savannah River Site				X		X		Westinghouse Savannah River
Stanford Liner Accelerator				X			X	Stanford University
West Valley Demonstration Project				X	X	X		West Valley Nuclear Svcs. Co.
Y-12 Plant				X		X		Martin Marietta Energy Sys, Inc

Table 3

2.2.2 GOCO Waste Management Facility Characteristics

The majority of DOE complexes are owned by the federal government and operated by private contractors. The weapons production complexes, usually the largest of these sites, are examples of traditional DOE management operations. The management structure of the weapons complex facilities is the responsibility of the Assistant Secretary for Defense Programs (ASDP). Supervision of the contractors at the sites is accomplished by field offices overseen by the Office of Defense Programs (DP).¹ As some of these sites are retired from weapons production, they are being placed under the oversight of the Office of Environmental Restoration and Waste Management (EM).

Because of the high priority the DOE has placed on the goal of full compliance with environmental and safety laws and regulations, along with the cleanup of its contaminated sites and facilities, the Office of Environmental Restoration and Waste Management was established at the assistant secretary level. This consolidation combined the responsibilities of three former DOE offices. Additionally, it provided separate budgets for Environmental Restoration and Waste Management so that this priority could be separately emphasized. The programmatic offices now included in EM are the Office of Waste Operations, the Office of Environmental Restoration, and the Office of Technology Development.²

In addition to weapons production facilities, DOE is responsible for a large number of DOE multiprogram laboratories. These laboratories play key roles as national scientific and engineering resources, as well as being contributors to United States business and technology enterprises.

GOCO laboratories were originally conceived as a means of enlisting private enterprise and management skills to develop nuclear weapons during World War II. Additional labs were added after the war, with an increased emphasis on developing civilian applications for nuclear technology.

GOCO regarded as a "unique organization and oversight structure that facilitates continuing excellence of performance within their mission areas."³ The organization and management of production and laboratory facilities involve four functionaries consisting of DOE Headquarters, the Office of Environmental Restoration, the DOE Operations Offices, and Waste Management and the contractors operating the programs for DOE.

The following is a description of the role of each operating element:

DOE Headquarters - DOE Headquarters provides financial and technical direction for work through their programmatic reviews.

Activities include managing institutional planning and approving institutional plans, participating in the appraisal process, reviewing non-DOE work, participating in decisionmaking regarding extension and compliance of Management & Operating (M&O) contracts. DOE Headquarters establishes schedules and initiates requirements.

DOE Office of Environmental Restoration and Waste Management - The EM's three divisions provide program responsibility for waste management at all DOE sites and for the cleanup of inactive hazardous and radioactive waste sites. Provisions are also made for new and more effective technologies that meet compliance and cleanup goals.

DOE Operations Office - The DOE operations office provides day-to-day oversight of laboratory, production, and ER activities. The office also conducts appraisals and reports site responses as well as overseeing and approving non-DOE work.

Contractor - The contractor maintains the management and operations of the facility in a safe and responsible manner. It is responsible for multidisciplinary research and development and other contracted production activities consistent with the facility's designated mission. Each contractor

has substantial flexibility in its operational decisions, which are subject to oversight by DOE.

This GOCO structure is designed to balance the need for government oversight of DOE operations with the requirement for flexibility in conducting laboratory and R&D-type activities, as well as the needs of DOE production and environmental restoration facilities. The GOCO concept has been based on a long-term partnership. The contractor is motivated by a variety of rewards, including that of public service and the opportunity to participate in research and development of national and international importance. Most contractors currently work on a cost-plus-award-fee structure. Most management and operating (M&O) contracts are negotiated on a cost reimbursement basis. Contracts are normally awarded in five-year increments.

Traditionally, the land, buildings, and equipment are owned by the government. The government provides funding, policy direction, and oversight. The contractor, through its management staff and employees, operates, maintains, and carries out the day-to-day programs of the government. Under M&O contracts, the government has assumed most of the liability and financial responsibility for the operations. However, DOE has proposed changes in the risk/liability provisions of its for-profit M&O contracts and subcontracts, which, if implemented, would drastically increase the risks and financial responsibility of these contractors and certain subcontractors under their current structure (see Reference 3).

2.3 Current Management System Tools and Strategies

In order to evaluate ownership alternatives it is necessary to review the types of management tools available. DOE currently uses three types of management tools for assigning and controlling work (see Reference 3).

The general overall management tool used by the DOE to oversee facility activities is called the Institutional Planning Process (IPP). The IPP

defines current and future directions, missions, and program areas and identifies specific review steps to facilitate communication between the DOE and the facility activities.

Another useful management tool is the Award Fee Program. The award fee program works as an incentive towards overall excellence.⁴

Five levels of evaluation ranging from outstanding to unsatisfactory are used to determine performance in the Award Fee Program. Traditionally, M&O contracts have provided that the contractor be reimbursed for the cost of operation, and that an additional fee be awarded based upon that contractor's performance.

The award fee program has recently come under critical review. An Environmental Protection Agency (EPA) Audit Report (March 1990)⁵ stated that the payment of award fees on Superfund cost-plus-award-fee contracts was "less than satisfactory" in achieving its intended goals. The audit found that:

- Award fees often failed to achieve excellence
- Performance evaluation procedures varied by contract
- Late appraisals hindered the award fee process (untimely feedback).

In connection with its proposed changes in the risk/liability provisions of its for-profit M&O contracts, DOE has proposed major changes in award fee structure for these contracts. The proposed structure would continue to use the newly revised award fee evaluation and determination system substantially put in place by DOE on October 1, 1989, which places greater emphasis on ES&H and contractor self-assessment. At certain defense facilities the potential total fee as a percentage of the negotiated basic fee could be as much as 300%. Some contractors have questioned whether or not this new award fee structure justifies the changes in the risk/liability provisions of the

contracts. An assessment of this new structure, however, goes beyond the scope of this study.

The third tool in DOE's repertoire is the Work Authorization Process. This system requires that:

- Work assignments be aggregated at the cost and obligations level
- The Program and Operations Office be assigned specific tasks for determining appropriate work assignments and monitoring performance
- Work assignments be consistent with the program and approved in the institutional plan
- Contractor performance be monitored in terms of work accomplishment.

Another influence DOE has is the decision whether to complete contract renewals. Also, under the Price Anderson Amendments Act of 1988, DOE can issue civil penalties against its contractors for nuclear safety violations and can refer criminal misconduct to the Justice Department.

It is not the intent of this study to evaluate the effectiveness of the DOE management tools and guidelines, but rather to provide this information so that it may be judged in terms of its applicability to the proposed configuration options. The way in which these tools will be applied to the ultimate configuration option selected by DOE will be a critical part in the designing of an implementation plan.

3. MANAGEMENT CONFIGURATION EVALUATION CRITERIA

Four major configuration management alternatives have been identified (GOGO, GOCO, COCO, P/P). In order to evolve to specific recommendations and supply supporting justification for them, key criteria have been identified and defined. The evaluation criteria are divided into three major groups. Some of the criteria overlap others and may, at times, appear to be contradictory. The criteria and their definitions can be considered as a matter and degree of perception by Team 3 members and independent reviewers. Only the first group, the discriminating criteria, are prioritized because they provide the significant rationale behind the proposed recommendations.

The first grouping consists of criteria defined as discriminatory criteria. A discriminatory criterion is an independent, essential, criterion-based ability to perform in an effective, successful manner while allowing a waste management facility to operate at an acceptable level. However, it is recognized that each management configuration has a different capability to satisfy these criteria requirements.

The second grouping, not independent but common to all, consists of criteria that are essential to the successful operation of a facility; however, all management configuration alternatives must perform at the same high standard. Though some configurations may be able to achieve these standards with greater ease than others, all four configuration options must perform these criteria requirements at the required standard.

The final grouping, although independent, is not essential to the functioning of the operation and is therefore not used in evaluating the management configurations. These criteria were identified and defined because they are important criteria and should be acknowledged in this study for completeness. It is recognized that each management configuration has a different capability to satisfy these criteria requirements.

3.1. Discriminatory Criteria

The discriminatory criteria are essential for a waste management facility to operate at an acceptable level. These criteria were used by Team 3 to evaluate the management configurations. These critical criteria should be viewed as conceptual tools rather than absolute criteria used in the decisionmaking process. These criteria are presented here in order of priority.

The Ability of an Organization to Manage Liability by Balancing Responsibility and Risk.

Liability is the extent to which an organization performing work for the DOE guarantees its performance and assumes responsibility for worker errors, damages, fines, penalties, or claims from third parties. In order to manage liability, the organization must be able to balance risk, responsibility, and reward. There should be a contractual limit by which financial consequences of third party damages, consequential damages, and other claims against the contractor are limited, except in the case of negligence or fraud.

In order to fully understand the possible implications that liability may have regarding management configuration options, the following issues must be addressed.

The Department's M&O contractors support DOE's goal of promoting high standards of management in contractor performance. However, liability must be understood, shared, and appropriately balanced between DOE and its M&O contractors. The M&O contractors recognize that the mission of the DOE facilities has changed significantly to encompass not only production but high standards of environmental, safety, and health activities. However, contractors should not have to bear an inordinate responsibility for the current problems primarily at DOE defense production facilities.

DOE has issued three separate but related Notices of Proposed Rulemakings (NOPR) (January 26 1990; May 24, 1990; and August 10, 1990) regarding the contracting practices and the fee arrangements with its for-profit and fee-bearing contractors (which includes some non-profit contractors). In summary, this proposed rule provides:

- Costs and expenses resulting from damage to government property resulting directly from ordinary negligence by the contractor or subcontractor where the costs which are to be borne by the contractor are those effecting repairs to, or replacement of, government property, and where DOE did not contribute to the negligence or wrongful act.
- Losses of government property resulting from theft, embezzlement, or unauthorized use.
- Fines, penalties, judgments, and other litigation costs arising from contractor or subcontractor noncompliance with environmental laws, where the contractor had the ability and resources to have complied.
- Judgments and other litigation costs stemming from common-law contractor or subcontractor negligence or misconduct, giving rise to simple tort liability to third parties.
- Civil and criminal penalties assessed pursuant to the Price-Anderson Amendments Act of 1988, Public Law No. 100-408, Sections 17-18, 42 USC 2273, 2282 (Price-Anderson Amendments) and costs of litigation involving such penalties. M&O contractors would otherwise continue to be indemnified against public liability for a nuclear incident as specified under Price-Anderson. (Under the Price-Anderson Amendments the Secretary of Energy is authorized to impose civil fines on certain government contractors for

violations of applicable DOE nuclear safety rules, regulations, and orders.)

- Cost of insurance for nonreimbursable avoidable costs.
- A ceiling is placed on liability of a contractor for avoidable costs (excluding costs under the Major Fraud Act and Price-Anderson Civil Fines and Penalties). This ceiling would be equal to the sum of the actual award fee earned and the actual basic fee earned for the six-month evaluation period during the event(s) that caused the avoidable costs to occur.

If DOE implements the latest NOPR as final rule, there are several questions as to the role of DOE's for-profit M&O contractors in environmental restoration and waste management organization. Will M&O contractors accept these new risk provisions or will they decline to continue as M&O contractors? If these contractors do accept these provisions, will the "defensive mode" of operation inhibit effective and timely performance? Will non-profit M&O contractors be better positioned to assume these responsibilities? Will prospective subcontractors who are covered by the NOPR be reluctant to participate? It should be noted that profitmaking subcontractors of non-profit M&O contractors are exempt from the rule. Also exempt are subcontractors who are small and small disadvantage businesses. If the latest available rule (55 FR 32874 August 10, 1990) is finalized, there will be a push toward the COCO management configuration to avoid liability of for-profit GOCOs.

Noteworthy at this time is the DOE proposed Alternate Business Strategy (55 FR 45844, October 31, 1990), which is a new form of contract to assist DOE in managing all environmental restoration work at each DOE Operations Office. As stated in the notice of intent, the Environmental Restoration Management Contractor (ERMC) would perform the functions of environmental restoration management currently being performed by DOE's M&O contractors. Conceptually,

each DOE Operations Office will have an ERM contractor and an Integration Management Contractor (IMC) located at DOE Headquarters to coordinate the activities of the ERMCs. The ERM will be a management contractor only and would not perform any assessment or remediation work. DOE's M&O contractors may not be ERM contractors at the same site but may participate as ERM contractors at other locations or become subcontractors at a different Operations Office. The DOE notice announcing this new concept does not indicate what liability or risk provisions would be applied to these new contracts. The assumption, however, is that these new contracts would not be M&O contracts and therefore would not be subject to the new liability provisions of the NOPR. This new contract concept may require a different analysis of the operational concepts for environmental restoration.

The Ability of an Organization to Respond to Political/Public Issues.

The ability to respond to political/public issues includes the capability to quickly and effectively respond to the needs of all concerned parties (e.g., media, public, Congress, states, Indian tribes, regulators). The management alternatives must be open to comments from interested individuals and groups. Information should be readily shared, and public comments welcomed. The management alternatives must be responsive to input from the public and interested groups. Comments should be evaluated carefully and management plans changed appropriately if a good suggestion is received. Other ideas that are rejected should be clearly explained and justified in a timely manner.

The Ability of an Organization to Perform Ill-Defined, High-Risk, or Changing Mission.

The ability to perform an ill-defined, high-risk, or changing mission is the flexibility of a management system to respond to changes in mission and to perform work scopes which are difficult to define or are inherently high-risk activities. The presence of ill-defined work scopes and the changes in

program direction and mission are common within the DOE community and special high-risk work scopes are unique to several DOE facilities and activities.

The ability to perform an ill-defined scope of work with high-risk and changing mission where DOE controls funding and provides intense management oversight appears to be totally inconsistent with the latest proposed rules on liability (55 FR 32874, August 10, 1990).

The Ability of an Organization to Perform in a Cost-Effective manner.

The ability to achieve mission throughout the business life cycles, fulfill services with the least cost and highest quality to the government, and maintain the most effective utilization of resources. Cost effectiveness determines the profitability and competitiveness, and therefore the incentive to continue to provide products and services. Long-term cost effectiveness is not sacrificed for short-term gains and profitability.

The Ability of an Organization to Apply Technology.

The ability to apply technology is the capability of management to apply the latest technology available, whether it be in the private or government sector or in the use of special contractual agreements where appropriate, to consider proprietary processes, patents, copyrights, and the like. The need to apply the best methods or processes that are available, no matter what their source, to solve the nation's environmental restoration and waste management problems as soon as possible underscores its importance as a discriminatory factor.

The Ability of an Organization to Apply Capital Funds.

The ability to provide total available dollar resources for effective mission accomplishment. The investment of this money would be for major assets such as buildings and equipment. Included is the ability to prioritize

allocation and/or reallocation of such funds according to changing circumstances. The capability to apply capital funds properly is essential to accomplish initial and continuing infrastructure requirements for waste management.

The Ability of an Organization to Control Personnel.

The ability to control personnel is the responsibility and capability to lead, manage, employ, assign, pay, furlough, and terminate the entire work force and to comply with local, state, federal, and organizational labor requirements. The ability to control personnel leads to the effective management of human resources towards the end goal of successful mission accomplishment.

The Ability of an Organization to Ensure a Reliable Continuous Operation.

The ability to ensure a reliable continuous operation is the capability to meet mission/objectives despite contractor management or organization structure changes.

The Ability of an Organization to Apply Operating Funds.

The ability to apply operating funds is the acquisition, allocation and control of funds utilized to accomplish the assigned mission. This criterion includes the capability to readily obtain operating funds as required. Such a capability is critical because the efficient application of funds is essential in controlling costs. Flexibility to reallocate operating funds is necessary to meet changing criteria.

The Ability of an Organization to Perform Procurement in a Flexible and Timely Manner.

The ability to streamline procurement is the ability to establish policies and procedures relating to procurement that will minimize the approval cycle and reduce the time cycle required to produce necessary products and services on both routine and emergency bases. The management configuration must have the flexibility to procure goods and services on a competitive basis. The management structure should offer flexibility in making decisions on selection of services, products, and suppliers.

3.2 Essential Criteria Common to All

These criteria are essential to the successful operation of any waste management facility. However, since all four management configuration options must perform at the same high standard for these criteria, they were not used by Team 3 in evaluating the management configurations. There is no delineation regarding at what level these activities will be performed based on management type. No ordering priority of these criteria is intended.

The Ability of an Organization to Meet the Physical and Operational Security Requirements and the Material Safeguards Requirements.

These requirements are defined by DOE orders and federal and state regulations. These requirements must be met regardless of the management option chosen. One management option may be able to more easily meet these requirements because of experience and captive infrastructure resources. However, the requirements are still a "must" and must be met regardless of cost, complexity, or management structure.

The Ability of an Organization to Achieve and Sustain Organizational Effectiveness.

To effectively lead personnel in support of DOE programs and requirements while efficiently managing their support of such activities via operationally sound priorities related to time, resource, effort, information technology, and fiscal practices. Sound organizational effectiveness of any organization requires both leadership and management of mutually supporting people, skills, experience, technology, and allied requirements for any enterprise. Without excellent organizational effectiveness there will only be the confusion of efforts with results. Organizational effectiveness is required for all management structures.

The Ability of an Organization to Comply with Environmental, Safety, and Health Requirements.

Environment, safety, and health (ES&H) is defined as those laws, regulations, and issues relating to environmental compliance of DOE facilities operations, with emphasis on waste management and environmental restoration activities. Protection of the health and safety of personnel at DOE facilities and of the general public is impacted, or potentially impacted, by DOE-funded activities. Within DOE, ES&H has become a top priority. Compliance with all regulatory requirements is required for all management structures.

The Ability of an Organization to Meet All National Security Requirements.

National security relates to activities of the waste management program that involve processes, products, equipment and documents, which, if released to the public domain, would seriously injure the best interests of the United States. The requirement for imposing restrictions on public release of national security matters is an absolute necessity and applies to all management structures.

The Ability of an Organization to Comply with Environmental Laws and Regulations.

Especially due to public sensitivity and political considerations, this criterion warrants "stand alone" status relative to other regulatory requirement criteria. DOE is equally committed to the goal of full compliance with all applicable laws and regulations in this key area. Any management alternative that cannot or will not meet this commitment is not considered in this report.

The Ability of an Organization to Meet the Requirements for Quality Performance.

Quality performance is an organizational value characterized by its ability to clearly define its objectives, to subdivide them until individuals or small elements are responsible for their accomplishment, to quantify how well individual objectives are achieved, and finally, to continuously invest time, talent, and money to improve measured performance. Regardless of management configuration, a dedication to quality performance enhances safe and cost-effective operations at DOE facilities.

3.3 Criteria Considered But Not Discriminatory

These important criteria are documented in the study to demonstrate their consideration in the Team 3 evaluation process. Although the four management configuration options may not perform at the same standard for these criteria, the criteria are considered, but not discriminatory in the decisionmaking process, because they are not of the highest priority. No ordering priority of these criteria is intended.

The Ability of an Organization to Meet Labor Acceptance Standards.

Labor acceptance standards should be set and achieved to consider labor union concerns and the need for a stable work environment.

The Ability of an Organization to Transition from One Organization to Another Organization or from One Operation to Another Operation.

Transition is defined as the ability to meet the changing requirements inherent in moving and reassigning from one mode of operation to another or from one contractor to another to perform environmental restoration or waste management activities. The organization should demonstrate operational readiness and understanding during the transition, while maintaining stable and continuous internal processes. The organization should be able to effectively shift funding, personnel and other resources in response to changing needs.

The Ability of an Organization to Meet DOE's Long-Term Contractual Commitments.

The ability of an organization to maintain a successful long-term relationship with DOE. Inherent in this ability is the requirement to maintain multi-year fully funded contracts working within the traditional fiscal year funding process.

The Ability of an Organization to Allow for, and Encourage, Technology Transfer.

Technology transfer consists of sharing relevant information, products, or achievements. This sharing can be organized by the government or by a private contractor. The management configuration should allow for and encourage technology transfer. It is recognized that traditionally this has been one of the major goals and accomplishments of the GOCO configuration.

Licensing programs, the use of DOE facilities by non-DOE users and science education programs are all important elements in this effort.

The Ability of an Organization to Complement the DOE Management Structure.

The organization must be able to work in harmony within the multiple federal levels of authority. To successfully accomplish the organizational mission, goals, and objectives, the organization must be able to complement the DOE management structure.

4. RECOMMENDATIONS AND CONCLUSIONS FOR MANAGEMENT CONFIGURATION OPTIONS

The Team 3 recommendations were formulated in subgroup evaluations of the 10 discriminatory criteria against the four management configurations (GOGO, GOCO, COCO and P/P). During the evaluation, a comparative analysis of functional, waste type, and process differences for each of the management options was performed using the 10 discriminatory evaluation criteria and other relevant issues.

In the recommendations process used by Team 3, the members were asked to form three subgroups of five persons. To identify functional differences, each subgroup addressed a DOE facility category (Production Facility, Environmental Restoration Sites, and National Research Laboratories). Each group reached a set of recommendations by applying the 10 discriminatory criteria and other relevant issues against the waste types (HLW, TUV, LLW, HZW, ER and RHW) and processes (treatment, storage, and disposal). Each category illustrates what type of waste management facility would be best suited for dealing with a specific waste type once it leaves the generator facility. To allow for, and incorporate, the coverage of all variables, the recommendations were derived working from the following statement:

"Under current and anticipated operating conditions and technologies a _____ management configuration is best suited for a treatment, storage, or disposal facility dealing primarily with _____ waste from a _____ facility."

The Team 3 recommendations indicated that functional differences were irrelevant in determining the best management option; a waste has the same recommended management structure independent of its institutional source. Recommendations were based on actual waste management requirements at the different facilities. The actual waste management requirements used to derive the recommendations were process and waste type oriented.

From the recommendations formulated in the Team 3 subgroup evaluation process, management configuration conclusions were formulated in an independent analysis of the recommendations. The conclusions that summarize the Team 3 recommendations are shown in Table 3.

Table 3. Management Configuration Conclusions			
Waste Type	Treatment	Storage	Disposal
HLW	GOCO	GOCO	GOCO
TUW	GOCO	GOCO	GOCO
LLW	COCO	COCO	GOCO
HZW	COCO	COCO	COCO
ER	COCO	COCO	GOCO
RHW	COCO	COCO	COCO

4.1 High-Level Waste (HLW)

Under current and anticipated operating conditions and technologies, a GOCO management configuration is best suited for a treatment, storage, and disposal facility dealing primarily with HLW.

The GOCO management configuration is recommended for handling HLW because it is most capable of meeting the organizational ability to:

- Manage liability by balancing responsibility, risk and reward
- Respond to political/public issues
- Perform ill-defined, changing, and high-risk mission
- Apply capital funds
- Ensure a reliable continuous operation.

Few private firms are willing to assume the financial and liability risks associated with handling HLW. The political and public concerns

surrounding HLW are high. Few private firms are willing to accept the high-risk mission of managing HLW. There is no commercial follow-on opportunity when handling HLW. Few private firms are capable of securing the capital to build the processing plants necessary for treatment of HLW (e.g., vitrification plant). Only the government has the resources to provide the level of capital required. Continuity and uncertainty problems favor GOCO in the managing HLW. Current legislative requirements dictate that HLW will be disposed of in a federal repository.

4.2 Transuranic Waste (TUV)

Under current and anticipated operating conditions and technologies a GOCO management configuration is best suited for a treatment, storage, and disposal facility dealing primarily with TUV.

The GOCO management configuration is recommended for handling TUV because it is most capable of meeting the organizational ability to:

- Manage liability by balancing responsibility, risk and reward
- Respond to political/public issues
- Perform ill-defined, changing, and high-risk mission
- Be cost effective
- Apply technology
- Apply capital funds
- Control personnel
- Ensure a reliable continuous operation
- Apply operating funds.

Few private firms are willing to assume the financial and liability risks associated with handling TUV. The political and public concerns surrounding plutonium-bearing TUV are high. Few private firms are willing to accept the high-risk mission of managing TUV. GOCOs are better able to fund high-risk research and development ventures. Technology transfer is inherent

in the GOCO structure. The GOCO configuration is better able to control personnel to research and development efforts. Long-term control and accountability favor GOCO in managing TUW. The GOCO is better able to apply operating funds to management of TUW because there is less emphasis on the return on investment. Current legislative requirements dictate certain TUW will be disposed of in the Waste Isolation Pilot Plant (WIPP).

4.3 Low-Level Waste (LLW)

Under current and anticipated operating conditions and technologies, a COCO management configuration is best suited for a treatment and storage facility dealing primarily with LLW.

Under current and anticipated operating conditions and technologies, a GOCO management configuration is also best suited for a disposal facility dealing primarily with LLW.

The COCO management configuration is recommended for treatment and storage of LLW because it is most capable of meeting the organizational ability to:

- Respond to political/public issues
- Be cost effective
- Apply technology
- Apply capital funds
- Control personnel
- Apply operating funds
- Streamline procurement.

COCOs have achieved a good political/public track record. The public perceives less hidden information in a private firm. The COCO management systems are designed to be more efficient because they must produce a profit. Commercial facilities have the "best available" ion exchange, incineration,

supercompaction and other treatment technologies. Because the work scope associated with handling LLW is clearly defined, the waste type is well known and readily characterized, LLW lends itself to unit pricing, and there is considerable commercial experience in handling LLW, COCOs are willing to privately invest in the management of LLW. COCOs also have greater ease of hiring and firing to obtain the most productive work force. Within the COCO configuration operational problems are quickly resolved. The COCO structure is less constrained by Federal Acquisition Regulations (FAR) and Department of Energy Acquisition Regulations (DEAR) and there is less bureaucracy in the COCO procurement process.

The GOCO management configuration is recommended for disposal of LLW because it is most capable of meeting the organizational ability to:

- Respond to political/public issues
- Perform ill-defined, changing, and high-risk missions.

Because of the GOCOs' long-term control and accountability, they are better able to respond to political/public issues concerning disposal. The longevity associated with disposal of radioactive wastes leads to greater risk, and GOCOs are better able to fund high-risk ventures. Present policy dictates disposal at a federal repository.

4.4 Hazardous Waste (HZW)

Under current and anticipated operating conditions and technologies a COCO management configuration is best suited for a treatment, storage, and disposal facility dealing primarily with HZW.

The COCO management configuration is recommended for treatment, storage, and disposal of HZW because it is most capable of meeting the organizational ability to:

- Respond to political/public issues
- Be cost effective
- Apply technology
- Apply capital funds
- Control personnel
- Apply operating funds
- Streamline procurement.

COCOs have historically proved to be successful in ownership and management of facilities handling HZW and, through this success, they have achieved a good political/public track record. The COCO management systems are designed to be more efficient to produce profit. COCOs currently have the "best available" technology for processing HZW. COCOs have greater ease of hiring and firing to obtain the most productive work force. Through their numerous licensed facilities, COCOs have demonstrated that they can bring a facility online faster than any other configuration to date. The COCO structure is less constrained by Federal Acquisition Regulations and Department of Energy Acquisition Regulations and there is less bureaucracy in the COCO procurement process.

4.5 Environmental Restoration Waste (ER)

Under current and anticipated operating conditions and technologies, a COCO management configuration is best suited for a treatment and storage facility dealing primarily with ER waste.

Under current and anticipated operating conditions and technologies, a GOCO management configuration is also best suited for a disposal facility dealing primarily with ER waste.

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The COCO management configuration is recommended for treatment and storage of ER because it is most capable of meeting the organizational ability to:

- Respond to political/public issues
- Be cost effective
- Apply technology
- Apply capital funds
- Control personnel
- Apply operating funds
- Streamline procurement.

The public will favor the COCO in cleaning up the environment because they were not the parties responsible for the problems making remediation now necessary. The public perceives less hidden information in a private firm. The COCO management systems are designed to be more efficient to produce profit. Funding for capital investment is readily available because public health is an overriding concern. COCOs have greater ease of hiring and firing to obtain the most productive work force. Within the COCO configuration, operational problems are quickly resolved. The COCO structure is less constrained by Federal Acquisition Regulations and Department of Energy Acquisition Regulations and there is less bureaucracy in the COCO procurement process.

The GOCO management configuration is recommended for disposal of ER because it is most capable of meeting the organizational ability to:

- Respond to political/public issues
- Perform ill-defined, changing and high-risk missions.

Because of the GOCOs' long-term control and accountability, they are better able to respond to political/public issues concerning disposal. The longevity associated with disposal of radioactive wastes leads to greater

risk, and GOCOs are better able to fund high-risk ventures. Present policy dictates disposal at a federal repository.

4.6 Radioactive Hazardous Mixed Waste (RHW)

Under current and anticipated operating conditions and technologies, a COCO management configuration is best suited for a treatment, storage, and disposal facility dealing primarily with RHW.

The COCO management configuration is recommended for treatment, storage, and disposal of RHW because it is most capable of meeting the organizational ability to:

- Respond to political/public issues
- Be cost effective
- Apply technology
- Apply capital funds
- Control personnel
- Apply operating funds
- Streamline procurement.

There are currently no permitted commercial RHW facilities; however, there are companies that are attracted to the business of managing RHW and that have submitted permit applications for handling RHW. COCOs have achieved a good political/public track record in the management of HZW and believe they will also be successful in managing RHW. COCO management systems are designed to be more efficient to produce profit. COCOs currently have the "best available" technology to separate and destroy organic components. COCOs are willing to make prudent investment in facilities and assume reasonable liability risks. They also have greater ease of hiring and firing to obtain the most productive work force. Through their numerous licensed facilities, COCOs have demonstrated that they can bring a facility online faster than any

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other configuration to date. The COCO structure is less constrained by FAR and DEAR, and there is less bureaucracy in the COCO procurement process.

5. SUMMARY AND ADDITIONAL CONSIDERATIONS

DOE and other federal government agencies are now facing the same crisis in waste management as did commercial industrial facilities in the early 1980s when many new hazardous waste regulations came into existence. DOE's oversight must be improved, tracking procedures implemented, and arrangements made to ensure control over the ultimate disposal of hazardous substances. Effective management systems must be implemented that will allow for DOE facilities to be upgraded in a cost-effective and timely manner, yet enable DOE to continue with production, research, and environmental restoration activities.

Regardless of which management configurations are implemented at DOE waste management facilities, these facilities will be forced to deal with issues inherent within legislative litigations, Tri-Party Agreements, and Federal Facility Compliance Agreements, as well as compliance with DOE policy. For example, a key dilemma surrounds liability strategy. There still is no cohesive government policy on how accountability among potential responsible parties will be allocated. Additionally, several technical problems associated with remediation remain unsolved and are very expensive at this time. Moreover, issues of uncertain funding, coupled with uncertain expenses, remain undefined: How much of these cleanups will be passed on to the taxpayers? Is the public willing to pay such an expensive price for a cleaner environment?

In addition to the procedural and policy issues, concerns can also be found in implementing major waste management goals. For example, four key waste management goals have been recognized as follows:⁶

1. The management of currently generated wastes in the most environmentally sound way by promulgating a comprehensive control system and establishing a technical and economic management infrastructure.

2. The reduction of hazardous waste generation.
3. The promotion of full compliance and elimination of illegal practices.
4. The allocation of full costs of waste management to the generators.

However, if one overall goal is reduction of waste, private investors may be reluctant to make large investments in a market which may decline from the current production. The long-run reduction of waste, which is the most environmentally sound waste management strategy, is in some ways incompatible with shorter-run needs to create and maintain a T/S/D infrastructure to handle the large amounts of waste presently generated. In theory, if one reduces waste there will not be enough of a product to justify cost of an expensive T/S/D facility. On the other hand, the expense of T/S/D facilities encourages the development of waste reduction.

It is difficult to ascertain definitively which configuration is best suited to meet all of the conflicting and inherent problems that continuously evolve. However, a wide range of options exists. Four of these (GOGO, GOCO, COCO and P/P) have been discussed. Which type of management system is implemented and ultimately determined successful, will depend on technical factors, economics and the political and regulatory culture of the country, and the perception of waste as a long-term risk problem for all involved parties.

If DOE is to remain with the current emphasis on GOCO facilities, changes must be made to allow this system to adjust to new regulations, policies, and criteria. A review must be made as to how M&O contracts are put into place. Currently, "moving" budgets coupled with the existing rules (including various DOE orders) make this process nearly impossible. How contracts are awarded and evaluated must also be carefully critiqued and revised.

The United States has traditionally taken a piecemeal approach toward management of the environment as opposed to a fundamental policy. Regulations protecting the air, for example, came into existence prior to regulations regarding land dumping. The result was that, while smoke stacks were cleaned up, the toxins they produced were transformed into sludge that was disposed of in a land dump. Such a piecemeal approach to regulatory requirements constructs a temporary camouflage while creating additional long-term contamination. DOE must establish a fundamental policy of how it will handle waste and then reflect that policy in its management structure.

In addition to the emphasis on regulatory requirements, the United States has relied on the private market to provide waste management facilities with an emphasis on land disposal and generally with no public subsidies. What will happen if the government builds, operates, and manages its own waste facilities, as well as creates the laws regulating its own operations? GOGO facilities will tend to be more expensive to construct and operate than the utilization of existing T/S/D facilities. Will we have stronger or weaker controls? Will things be more unified? Will GOGO facilities be in contradiction to the free enterprise system? How much government intervention is tolerable? What is wrong with government control since the government has already taken on the immense expense of remediation of past mistakes? All of these questions must be openly and honestly considered if a viable management configuration is to be developed and enforced.

REFERENCES

1. "The Nuclear Weapons Complex, Management for Health, Safety, and the Environment," Committee to Provide Interim Oversight of the DOE Nuclear Weapons Complex, Commission on Physical Sciences, Mathematics, and Resources National Research Council, 1989.
2. Environmental Restoration and Waste Management Modernization Study; Phase I: Initial System Configuration Alternatives, Team 2 Study, Draft 3, September 7, 1990.
3. Multiprogram Laboratories: 1979 to 1988, A Decade of Change, U.S. Department of Energy, April 1990.
4. "The Nuclear Weapons Complex," Committee to Provide Interim Oversight of the DOE Nuclear Weapons Complex, 1989.
5. "Report of Audit on Superfund Cost-Plus-Award-Fee Contracts," Environmental Protection Agency, March 28, 1990.
6. Piasecki, Bruce and Gary A. Davis, America's Future in Toxic Waste Management, Lessons From Europe, Greenwood Press, Inc., 1987.

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APPENDIX A

GENERAL FUNCTIONS SITE DESCRIPTIONS

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APPENDIX AGENERAL FUNCTIONS SITE DESCRIPTIONS

The following is a general description of each site's major function. This list is meant to give the reader a general understanding of what types of facilities DOE is directly involved with. It is not meant to be a complete listing but is based on the best available information at this time.

Facility	Contractor/Operator
Argonne National Laboratory - East Argonne, IL	University of Chicago Chicago Operations Office (Argonne Area Office)
Energy Research Laboratories - Provides basic experimental and theoretical research on problems in the physical, life, and experimental sciences. Provide support to DOE and other federal agencies in evaluating and developing national technology options.	
Ashtabula Plant Ashtabula, Ohio Defense Materials Production	Reactive Metals, Inc
Cleanup of this site is being performed in conjunction with the Feed Material Production Center.	
Brookhaven National Laboratory Upton, New York	Associated Universities, Inc Chicago Operations Office (Brookhaven Area Office)
Energy Research Laboratories - Conceives, designs, builds, and operates large experimental research facilities for fundamental scientific studies. Areas of study include high-energy physics, nuclear physics, life sciences, and nuclear medicine.	
Feed Materials Production Center Fernald, Ohio	Westinghouse Materials Co. of Ohio

Facility	Contractor/Operator
<p>Capability for processing uranium compounds into metals, melting and casting uranium metal, and machining uranium shapes to finished dimensions. Current activities constitute cleanup and waste management.</p>	
<p>Fermi National Accelerator Laboratory Batavia, Illinois</p> <p>Research - Proton synchrotron, which is used in research in high-energy physics and in treating cancer patients.</p>	<p>University Research Association, Inc. Chicago Operations Office</p>
<p>Hanford Reservation Richland, Washington</p> <p>Principal facilities include the N Reactor, nuclear fuel fabrication, Purex, PFP, liquid waste solidification, Fast Flux Facility, and a broad variety of energy-related research laboratories.</p>	<p>Westinghouse Hanford Co. Richland Operations Office</p>
<p>Idaho National Engineering Laboratory Idaho Falls, Idaho</p> <p>Defense Program Laboratory/Energy Research - Performs defense-related nuclear material production focused on receipt, storage, and processing of spent fuels and waste management. Provides waste management and waste technology development for low-level and transuranic waste.</p>	<p>EG&G Idaho, Inc. Idaho Operations Office</p>
<p>Inhalation Toxicology Research Institute Albuquerque, New Mexico</p> <p>Energy Research Laboratories - Houses up to 15,000 research animals and conducts studies on the health effects of inhaling fission products, fuel cycle actinides, insulating materials, coal combustion effluent, and diesel exhaust emissions.</p>	<p>Lovelace Biomedical and Environmental Research Institute Argonne Operations Office</p>
<p>Kansas City Plant Kansas City, Missouri</p>	<p>Allied Signal Corporation Albuquerque Operations Office</p>

Facility	Contractor/Operator
<p>Defense, weapons development and production. Manufactures non-nuclear components for nuclear weapons; no radioactive materials are processed at the plant.</p>	
<p>Lawrence Berkeley Laboratory Berkeley, California</p>	<p>University of California San Francisco Operations Office</p>
<p>Energy Research Laboratories - Performs leading multidisciplinary research in general, energy, and life sciences. Major education and training programs.</p>	
<p>Lawrence Livermore National Laboratory Livermore, California</p>	<p>University of California San Francisco Operations Office</p>
<p>Defense Program Laboratory - Provides research, development, and testing related to the nuclear design aspects of all phases of nuclear weapons life cycles.</p>	
<p>Los Alamos National Laboratory Los Alamos, New Mexico</p>	<p>University of California Albuquerque Operations Office</p>
<p>Defense Program Laboratory - Primary mission is nuclear weapons research and development. Conducts applied programs in support of defense missions, including development of nuclear warheads, new concepts for defense, conventional weapons technology, and arms control. Supports basic research in selected disciplines.</p>	
<p>Mound Laboratory Miamisburg, Ohio</p>	<p>EG&G Mound Lab Albuquerque Operations Office</p>
<p>Weapons Development/Production - Research and development activities in support of DOE's weapons program. In addition Mound Laboratories separates, purifies, and sells stable isotopes, and manages DOE programs in solar energy, fossil fuels, nuclear safeguards and waste management, and fusion fuel systems.</p>	

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Facility	Contractor/Operator
Nevada Test Site Nye County, Nevada	Reynolds Electrical & Engineering Co EG&G Energy Measurement, Inc Nevada Operations Office
Major programs include nuclear weapons development, proof-testing, and weapons safety, basic research in high-energy nuclear physics and studies in high-level waste storage.	
Oak Ridge Gaseous Diffusion Plant Oak Ridge, Tennessee	Martin Marietta Energy Systems, Inc Oak Ridge Operations Office
Technology development, contractual work, and interim waste storage. Currently out of production but serving as a waste management and surplus facility center.	
Oak Ridge National Laboratory Oak Ridge, Tennessee	Martin Marietta Energy Systems, Inc Oak Ridge Operations Office
Energy Research Laboratory - Conducts applied research and engineering development in fusion, fission, conservation, fossil, and other energy technologies. Supply radioactive and stable isotopes that are not available from the private sector.	
Paducah Gaseous Diffusion Plant Paducah, Kentucky	Martin Marietta Energy Systems, Inc Oak Ridge Operations Office
Uranium enrichment plant, with associated manufacturing and support facilities.	
Pantex Plant Amarillo, Texas	Mason and Hanger-Silas Mason Co. Inc. Albuquerque Operations Office
Weapons Development - Principal activity is the final assembly of nuclear weapons. "This involves the fabrication and testing of chemical high-explosive components; modification, repair, and retirement of nuclear weapons; and stockpile surveillance activities."	
Pinellas Plant St. Petersburg, Florida	General Electric Co. Albuquerque Operations Office

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Facility	Contractor/Operator
Weapons Development/Production - Designs, develops, and manufactures special electronic and mechanical components for nuclear weapons.	
Princeton Plasma Physics Laboratory Middlesex County, New Jersey	Princeton University Chicago Operations Office
Research - Engaged in fusion energy research.	
Portsmouth Gaseous Diffusion Plant Portsmouth, Ohio	Martin Marietta Energy Systems Oak Ridge Operations Office
The principal process is the separation of uranium isotopes by gaseous diffusion.	
Rocky Flats Plant Golden, Colorado	EG&G Rocky Flats Rocky Flats Operations Office
Weapons Development/Production - Produces nuclear weapons components.	
Sandia National Laboratories Albuquerque, New Mexico Livermore, California Nye County, Nevada	AT&T Technologies, Inc Albuquerque Operations Office
Defense Programs Laboratory - Provide R&D associated with weapons engineering for all phases of nuclear weapons life cycle. Provide fundamental energy research.	
Savannah River Site Aiken, South Carolina	Westinghouse Savannah River Co. Savannah River Operations Office
Production - Produces plutonium and tritium for national defense and civilian purposes. Facilities include three production reactors, two fuel fabrication facilities, and two chemical separations facilities. There is an extensive research program at the Savannah River Laboratory and Savannah River Ecology Laboratory.	
Stanford Linear Accelerator Stanford, California	San Francisco Operations Office
Research facility.	

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Facility	Contractor/Operator
Waste Isolation Pilot Plant Carlsbad, NM	Westinghouse Electric Co. Albuquerque Operations Office
Designed to receive, handle, and provide permanent isolation for, defense generated TUW.	
West Valley Demonstration Project West Valley, New York	West Valley Nuclear Services Idaho Operations Office
Reprocessed some spent fuel from civilian nuclear reactors and Hanford; processing terminated in 1972. Currently in the process of immobilizing 600,000 gallons of HLW.	
Y-12 Plant Oak Ridge, Tennessee	Martin Marietta Energy Systems, Inc. Oak Ridge Operations Office
Produces nuclear weapons components and provides support for weapons design laboratories.	

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APPENDIX B

DOE WASTE MANAGEMENT FACILITIES BY WASTE TYPE

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APPENDIX BDOE WASTE MANAGEMENT FACILITIES BY WASTE TYPE

For the purposes of this document, the Team 2 definitions and key locations will be used to enhance continuity of effort and overall coordination and understanding. The following breakdown of sites by waste type was taken from the Team 2 studies. For each waste type, a brief definition is given, the locations of sites managing this waste type are identified, and summary comments about the treatment, storage, and disposal of the waste are provided. The locations listed are meant to give the reader an overview of which, and how many, sites are handling that particular waste type. Because of the changing nature of these lists, the reader should not consider them definitive.

High-Level Waste*Definition*

High-level waste (HLW) is defined as the highly radioactive material that results from the processing of spent nuclear fuel, including liquid waste produced directly in processing and any solid waste derived from the liquid, that contains fission products in concentrations requiring permanent isolation.

Location

Savannah River Site	Aiken, South Carolina
Idaho National Engineering Laboratory	Idaho Falls, Idaho
Hanford Site	Richland, Washington
West Valley Demonstration Project	West Valley, New York

Comments

Generally, HLW is being stored in tanks instead of being disposed of. No HLW is currently being transported between sites. The following list shows both the current and planned treatment facilities for these sites.

Savannah River Site - Defense Waste Processing Facility (DWPF) (1992)
Idaho National Engineering Laboratory - converts its HLW into calcine
Hanford Reservation - vitrification facility (2000)
West Valley Demonstration Project - vitrification facility (1993)

Long-range plans may include the development of on-site vitrification facilities to allow for its future transportation. Once the HLW has been immobilized, a permanent storage and disposal methodology is required. Currently, it is DOE's intention to place HLW in one national geologic repository, (Yucca Mountain, NV); such a repository is still in the early planning and development stage. In the interim, several retrievable storage alternatives are being considered: on-site, regional, and centralized.

Transuranic Waste*Definition*

Transuranic waste (TUV) is defined as waste contaminated with alpha-emitting radionuclides having atomic numbers greater than 92, half-lives greater than 20 years, and in concentrations greater than 100 nCi/g in the waste at time of assay.

Location

Hanford Reservation	Richland, Washington
Idaho National Engineering Laboratory	Idaho Falls, Idaho
Lawrence Livermore National Laboratory	Livermore, California

Los Alamos National Laboratory
Nevada Test Site
Oak Ridge Operations
Rocky Flats Plant
Savannah River Site

Los Alamos, New Mexico
Mercury, Nevada
Oak Ridge, Tennessee
Golden, Colorado
Aiken, South Carolina

Comments

Wastes resulting from the processing of plutonium-bearing reactor fuel and fabrication of plutonium-bearing weapons are often transuranic in nature. Most TUW is rags, coveralls, rubber gloves, tools etc. The amount and nature of TUW disposed of prior to 1970 can only be estimated. Since 1970, TUW has been stored as retrievable waste in interim storage awaiting the opening of the Waste Isolation Pilot Plant (WIPP) in Carlsbad, New Mexico, where disposal is planned. Treatment consists of various volume reduction techniques (where practical) such as incineration, compaction, extraction, ion exchange, and shredding. Large amounts of liquid TUW, both aqueous and organic, are treated to produce solid TUW. Liquid treatment process includes immobilization, precipitation, clarification, filtration, and evaporation. Treatment and storage alternatives being considered are on-site, regional, and centralized. The disposal alternative being considered is centralized at the WIPP.

Low-Level Waste

Definition

Low-level waste (LLW) is radioactive waste not classified as high-level waste, transuranic waste, spent nuclear fuel, or by-product material specified as uranium or thorium tailings and waste. Treatment includes ion exchange, super compaction, smelting, and incineration. The disposal for most LLW is shallow-land disposal.

Location

Feed Materials Production Center	Fernald, Ohio
Hanford Reservation	Richland, Washington
Idaho National Engineering Laboratory	Idaho Falls, Idaho
Lawrence Livermore National Laboratory	Livermore, California
Los Alamos National Laboratory	Los Alamos, New Mexico
Nevada Test Site	Mercury, Nevada
Oak Ridge Operation	Oak Ridge, Tennessee
Rocky Flats Plant	Golden, Colorado
Savannah River Site	Aiken, South Carolina

Comments

No requirement currently exists to retrieve previously disposed of LLW. Treatment of LLW consists mostly of volume reduction activities: shredding, incineration, size reduction, and compaction. The standard disposal method for LLW is shallow-land burial. Treatment alternatives being considered are on-site, regional, and central. Some amount of on-site treatment will be required prior to transportation. Large amounts of liquid LLW, both aqueous and organic, are generated and treated. Treatment processes include immobilization, precipitation, filtration, evaporation, and ion exchange. Storage alternatives being considered are on-site, regional, and central. Disposal alternatives being considered are regional and central.

Radioactive Mixed Waste

Definition

Radioactive hazardous mixed waste (RHW) is defined as "those radioactive wastes that also meet the definition of hazardous under RCRA." They specifically address hazardous waste mixed with LLW. High-level and

transuranic mixed wastes are considered an integral part of HLW and TUV streams.

Location

Feed Materials Production Center	Fernald, Ohio
Hanford Reservation	Richland, Washington
Idaho National Engineering Laboratory	Idaho Falls, Idaho
Los Alamos National Laboratory	Los Alamos, New Mexico
Nevada Test Site	Mercury, Nevada
Oak Ridge Gaseous Diffusion Plant	Oak Ridge, Tennessee
Oak Ridge National Laboratory	Oak Ridge, Tennessee
Paducah Gaseous Diffusion Plant	Paducah, Kentucky
Portsmouth Gaseous Diffusion Plant	Portsmouth, Ohio
Rocky Flats Plant	Golden, Colorado
Savannah River Site	Aiken, South Carolina
Y-12 Plant	Oak Ridge, Tennessee

Comments

Configuration alternatives being considered for RHW include on-site, regional, and central treatment and storage, and regional and central disposal. The possibility of giving RHW to commercial vendors for treatment and disposal is being evaluated. This approach would greatly increase the federal government's liability by mingling DOE's wastes with commercial wastes in multiple sites. Failure at any of these sites could lead to remediation costs.

Hazardous Waste

Definition

Hazardous waste (HZW) is defined as those chemical wastes regulated by RCRA. The regulated substances are defined in 40 CFR 261 as ignitable, corrosive, reactive, toxic, and listed (production wastes and off-specification chemical substances). The Team 2 report also includes polychlorinated biphenyls (PCBs) and asbestos (both regulated under the Toxic Substances Control Act) in their definition.

Location

Feed Materials Production Center	Fernald, Ohio
Hanford Reservation	Richland, Washington
Idaho National Engineering Laboratory	Idaho Falls, Idaho
Los Alamos National Laboratory	Los Alamos, New Mexico
Nevada Test Site	Mercury, Nevada
Oak Ridge Gaseous Diffusion Plant	Oak Ridge, Tennessee
Oak Ridge National Laboratory	Oak Ridge, Tennessee
Paducah Gaseous Diffusion Plant	Paducah, Kentucky
Portsmouth Gaseous Diffusion Plant	Portsmouth, Ohio
Rocky Flats Plant	Golden, Colorado
Savannah River Site	Aiken, South Carolina
Y-12 Plant	Oak Ridge, Tennessee

Comments

Configuration alternatives being evaluated for HZW include on-site, regional, and central treatment and storage, and regional and central storage. Treatment and disposal are primarily accomplished through the use of private sector facilities. This can greatly increase the government's liability should a problem occur by commingling its wastes with others.

Environmental Waste

Definition

Environmental wastes are defined as those wastes resulting from past DOE nuclear operations. Environmental wastes include radioactive, hazardous, and radioactive hazardous mixed wastes.

Location

Sites considered for environmental restoration are no longer a part of active operations. Activities at these sites were first connected with the production of nuclear weapons and materials for national defense, but have more recently included programs for the development of nuclear electric power sources and carrying out basic nuclear research.

Comments

Since much of the contamination is groundwater and soil related, treatment options are likely to be on-site. Soil could be transported for treatment and disposal. Large quantities of contaminated waste from various sites may focus on regional and local solutions.

APPENDIX C

REFERENCE BIBLIOGRAPHY

EM CONFIGURATION STUDY
OPERATIONS CONCEPTS

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EM CONFIGURATION STUDY

OPERATIONS CONCEPTS

"A Guide to Implementing OMB Circular A-76," Peat Marwick, June 1985

"Assessing Contractor Use In Superfund, A Background Paper of OTA's Assessment on Superfund Implementation," Office of Technology Assessment, Congress of the United States, January 1989.

Bringer, Robert, "Organizing Your Environmental Protection Program for Maximum Effectiveness," in Environmental Management Report, Number 8, Second Quarter 1988, Government Institutes, pp. 31-41.

Cochran, Thomas, . W. Arkin, R. Norris, M. Hoenig, U.S. Nuclear Warhead Production, Volume II, Natural Resources Defense Council, Ballinger Publishing, 1987.

Coryell, John W., "A Generator Looks at TSDs and Testing Laboratories," Environmental Management Report, Number 4, Second Quarter 1987, Government Institutes Inc., pp. III-1 to III-16.

"Environmental Liability: Uncertain Times for Government Contractors," in NCMA Journal, pp. 45-51, July 1990.

"Environmental Management Systems, Assessment Workbook," by Arthur Little, Inc., Prepared for The Environmental Auditing Task Force of the Edison Electric Institute, June, 1989.

PREDECISIONAL DRAFT

Environmental Restoration and Waste Management Five-Year Plan: Annual Update for Fiscal Years 1992-1996, U.S. Department of Energy, Predecisional Draft, March 1990.

Environmental Restoration and Waste Management Configuration Study; Phase I: Initial System Configuration Alternatives, Team 2 Report, Draft 3, September 7, 1990.

Friedman, Frank, Practical Guide to Environmental Management, Environmental Law Institute, 1988.

Hazardous Waste: Contractors Should Be Accountable for Environmental Performance, U.S. General Accounting Office, GAO/RCED-90-23, October 1989

Managing Nuclear Waste, A Better Idea, Advisory Panel on Alternative Means of Financing and Managing Radioactive Waste Facilities, A Report to The U.S. Secretary of Energy, December 1984.

Martin, Lawrence R., "Demanding Waste Reduction: The Roles of Public Interest Organizations in Promoting the Institutionalization of Waste and Toxic Reductions," in The Environmental Professional Journal, Civil Engineering Department, School of Engineering and Applied Science, Volume 11, Number 2, University of California, Los Angeles, 1989, pgs. 132-141.

"Multiprogram Laboratories: 1979 to 1988 A Decade of Change," U.S. Department of Energy, April 1990.

"OMB Circular No.A-46 (Revised), Performance of Commercial Activities, Supplement," Office of Management and Budget, August 1983.

Piasecki, Bruce and Gary A. Davis, America's Future in Toxic Waste Management, Lessons from Europe, Greenwood Press, Inc., 1987.

"Privatization Program Management: Facilities and Services," Department of the Air Force, May 1988.

"Privatization, Toward More Effective Government," Report of the President's Commission on Privatization, March 1988.

"Report of Audit on Superfund Cost-Plus-Award-Fee Contracts," Environmental Protection Agency, March 28, 1990.

Simmons, James R., "The Burning Question: A Policy Analysis of Bloomington Indiana's Flawed Efforts at Public-Private Cooperation," in The Environmental Professional Journal, Volume 10, Number 3, Civil Engineering Department, School of Engineering and Applied Science, University of California, Los Angeles, 1988, pp. 223-233.

Soden, Dennis L., Nicholas Lovrich, John Pierce and Berton Lamb, "Public Involvement in Natural Resource Policy Processes: A View from the Inside-Out," in The Environmental Professional Journal, Volume 10, Number 4, Civil Engineering Department, School of Engineering and Applied Science, University of California, Los Angeles, 1988, pp. 304-316.

Strelow, Roger, "Organizing and Managing an Environmental Protection Program," in Environmental Management Report, Number 4, Second Quarter 1987, Government Institutes, Inc. pp. 1-2 to 1-13.

"Superfund Contracts: EPA Needs to Control Contractor Costs," U.S. General Accounting Office, GAO/RCED-88-182, July 1988.

The Environmental Professional Journal, Volume 11, Number 3, 1989, Volume 11, Number 4, 1989, Civil Engineering Department, School of Engineering and Applied Science, University of California, Los Angeles.

PREDECISIONAL DRAFT

"The Nuclear Weapons Complex, Management for Health, Safety, and the Environment," Committee to Provide Interim Oversight of the DOE Nuclear Weapons Complex, Commission on Physical Sciences, Mathematics, and Resources National Research Council, 1989.

"The Privatization Review," The Privatization Council, Inc., Volume 3, Number 3, Summer 1987.

"1987 Sponsors' Directory: Annual Guide to Sponsors and Corporate Members of the Privatization Council, Inc.," 1987.