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U.S. ARMY CORPS OF ENGINEERS

Report to the Associate Director for Natural
Resources, Energy and Science
Office of Management and Budget

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SUPPLEMENTAL REPORT ON COST ESTIMATES

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Executive Summary

Purpose

The Office of Management and Budget (OMB) and the U.S. Army Corps of Engineers have completed an analysis of the Department of Energy's (DOE) Fiscal Year (FY) 1993 budget request for its Environmental Restoration and Waste Management (ERWM) program. The results were presented to an interagency review group (IAG) of senior Administration officials for their consideration in the budget process. This analysis included evaluations of the underlying legal requirements and cost estimates on which the ERWM budget request was based. The major conclusions are contained in a separate report entitled, "Interagency Review of the Department of Energy Environmental Restoration and Waste Management Program." This Corps supplemental report provides greater detail on the cost analysis.

Results In Brief

Using the methodologies described in this report, it was found that DOE's estimated costs were higher than the Corps estimates for comparable environmental restoration and waste management projects. Specifically, after a detailed evaluation of nearly \$1 billion (18 percent of the ERWM program), costs were found to be higher than the amounts the Corps would expect to pay for the same work by 42 percent. The primary difference in the estimates can be attributed to overhead and administrative costs that may be saved through changes in management and contracting procedures.

In deriving this result, project costs as presented in the DOE budget, were disaggregated into several components: direct costs, overhead and administrative expenses, contingency, and a price escalation factor. A second cost estimate was derived by using the relationships among these cost categories that normally apply to similar Corps projects, and the original and subsequently derived estimates were compared. Every effort was made to find comparable Corps projects. It is nonetheless true that Corps projects generally involve hazardous waste and not waste containing both hazardous and radioactive waste commonly found in the ERWM program.

In order to enhance the validity of the cost comparisons, it was generally assumed that direct project costs were those stated by DOE. Direct costs were separately analyzed as part of the overall evaluation, and in many cases, it appeared that these costs could also be reduced. Both the general conclusions on overhead, administrative, contingency, and escalation costs and the specific conclusions on direct costs are incorporated into the findings and recommendations that follow.

In addition to this comparative cost analysis, additional activities were analyzed to gain a better understanding of how DOE prepared its cost estimates. This review led to additional findings that are described in this report.

During the presentations to the IAG, DOE indicated that its Office of Environmental Restoration and Waste Management has initiated multiple actions to reduce program costs and improve the accuracy of budget estimates. These include: conducting internal assessments of cost estimating practices; developing automated methods for calculating and reporting cost data; formalizing management guidance to establish scope, schedule and cost baselines for all activities in the ERWM program; and implementing the Progress Tracking System which will track all Activity Data Sheets (ADSs). However, these initiatives had not yet been fully developed at the time of the OMB/Corps inspections. The findings and recommendations of this report are based on an analysis of costs as they existed at the time of the site visits.

Summary of Findings

DOE lacks a standardized cost estimating system and procedures to prepare budget estimates and apply escalation and contingency factors and overhead rates. — Because there is no consistent departmental policy on preparing cost estimates for the ERWM program, the methods used for preparing such estimates varied both within and among all field offices. Consequently, the manner of preparing, approving and applying overhead costs and contingency and escalation factors also varied. Overhead rates varied within sites, between sites and between the ER and WM programs. The level of detail for ADS cost estimates did not always reflect all of the available information known about project scope and schedule. The accuracy of estimates was limited by: extensive use of large lump-sum cost items; high unit costs that were not discounted for large quantities; and applying large contingency factors to estimates instead of quantifying work requirements. In addition, some contractors used inappropriate calculations to prepare cost estimates (e.g., applying sales tax to labor costs).

The review also found that contractors and ERWM site personnel sometimes overstated their cost estimates because of major unknowns and uncertainties regarding the scope of clean-up requirements, threat of enforcement actions, personal liability and other reasons.

DOE contracting procedures incur higher costs. — Field Offices use Management and Operating (M&O) and independent contractors to accomplish the following procurement and contract administration actions commonly performed by Corps employees in carrying out the Corps military construction and civil works programs:

- Develop scope of work for Architect-Engineer (A-E) contracts;
- Produce government cost estimates for A-E fees for design or study contracts;

- Select A-Es and negotiate contracts;
- Conduct a technical review of A-E work to include studies, designs and construction cost estimates;
- Solicit, award and administer competitively bid construction contracts; and
- Perform quality assurance during construction and enforce warranties.

The M&O contractors also apply higher labor and overhead rates to procurement functions and they normally add overhead costs to the work they sub-contract. In some cases, competition for design and construction contracts is limited. Many M&O contractors appear to repeatedly negotiate subcontracts with the same contractors. Moreover, a limited number of M&O and environmental contractors obtain DOE work. Some site policies on implementing the requirements of Public Law 95-507 concerning small and disadvantaged contractors limit all contracts under \$3 million to minority contractors. This may affect the choice of cost effective solutions.

Available federal staff to prepare and review technical documents and cost estimates is insufficient to estimate project costs accurately. — The review teams found numerous instances where effective federal oversight of contractors at the ERWM sites was lacking. Contractors routinely prepare and review technical documents and cost estimates. However, field offices lack experienced engineers to review these documents and estimates. ADSs containing questionable scopes of work and costs were forwarded to HQDOE for inclusion in the DOE Five-Year plan.

Project costs are not adequately linked to the budget request. — Some ADSs are overstated by including costs for completed or cancelled work and by not accounting for carryover funds from prior fiscal years. The cost estimates, project scopes and schedules were not adjusted to reflect changes in the budget or actual work progress. Carryover funds were not reflected in the FY 1993 budget request. Project-specific ADS estimates contained direct costs for items such as training, permitting, safety, health, compliance and project management. These same items also appeared in the M&O contractor overhead rates and other program-wide ADSs at field offices. Because costs are not clearly tracked, there is the possibility that some activities are overstated by being estimated in several ADSs and in contractor overhead rates.

Recommendations

Based on the analysis of cost estimates and cost estimating procedures described in this report, it is recommended that the Secretary of Energy adopt the following measures to ensure environmental activities are conducted in a more cost-effective manner for the ERWM program:

Establish policies and procedures to estimate costs. -- Departmental policies and procedures for the ERWM program must be established to assure that overhead rates and escalation and contingency factors are applied in the same manner at all sites and are based on actual project requirements to form the budget request. Targets and goals should also be established to reduce overhead costs. Project schedules and costs should be updated to reflect changes in either funding availability or project execution. DOE should undertake a more detailed review of cost estimating policies and procedures, with emphasis on the consistent application of overhead rates, escalation and contingency factors.

Improve accountability for and tracking of project costs. -- An independent audit should be made of the accounting and budgeting policies and procedures of DOE and the M&O contractors. The audit should analyze prior-year fiscal performance to assess deficiencies and to recommend corrective actions. This process would assist DOE in developing and implementing improved budget estimating policies and procedures to ensure consistent application of rates and factors for overhead, contingency and escalation and create a useful source of historical cost data. As part of the audit, current practices for assigning base services costs should be re-examined to apportion indirect expenses based on the use of services by individual program activities at each site, including ERWM projects. An independent audit will provide a fresh look at policies and procedures that may need revision.

Improve federal oversight of contractors. -- The budget should be structured so that within the available funding limits, DOE would accommodate a substantial increase in the number of federal personnel at the Field Offices with expertise in engineering (particularly cost engineers), contract administration, budget preparation and control and project and construction management. This would provide an enhanced capability to review and manage ADSs, technical scopes of work and cost estimates prepared by DOE contractors and to ensure that appropriate amendments are made to ADSs. For example, by conducting a pilot study at a Field Office, with DOE acting as the procurement agent and contract administrator, projected savings in overhead costs could be compared to existing management practices. Other measures that deserve consideration include:

- Separating the study, design and construction phases of projects and competitively bid work when possible;
- Conduct a sufficient review to assure that DOE contractors are operating effectively, efficiently, and in the best interest of the federal government;
- Review contract clauses to reasonably assure such clauses are in the best interest of DOE and the federal government; and
- Conduct an independent review of DOE's current contracting methods.

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OMB Letter Requesting Assistance dated September 26, 1991

Introduction

Background

In a letter dated September 26, 1991, OMB requested that the Assistant Secretary of the Army for Civil Works provide assistance through the U.S. Army Corps of Engineers in analyzing three issues regarding DOE's proposed FY 1993 Environmental Restoration and Waste Management (ERWM) program (see Appendix). The assistance requested included the following areas: show the relationship between activities proposed in DOE's ERWM program and the requirements of compliance agreements signed with the Environmental Protection Agency (EPA) and various state governments, court orders or consent decrees, and applicable federal and state regulations and statutes; identify the remedy selection (preferred cleanup alternative) assumed for each site and operable unit within each site, and determine whether such remedy selection is required by a compliance agreement, consent order or decree, statute or regulation; and analyze the overhead, administrative, contingency, and other costs included in the cost estimates for the FY 1993 budget request to OMB, and compare them to similar costs in analogous federal and private sector design and construction projects.

The first and second issues, in which the Corps actively participated, are covered in a separate report. The analysis contained in this report pertains to the cost estimating procedures used to prepare the ERWM budget request for FY 1993. (Comparisons to the private sector were not possible because of a lack of published data on costs for comparable projects.) The cost categories used in this analysis were defined by OMB.

In response to the OMB request, the Corps organized five teams from five Corps Divisions and 14 Districts to join with OMB to inspect certain aspects of Headquarters DOE (HQDOE) and all major DOE Field Offices between October 16, and December 6, 1991, to obtain information on legal requirements, technical alternatives for remedial actions, and costs. A total of 67 Corps employees were involved during this two-month period, and they amassed a total of 13,424 staff hours which equates to 7.6 staff years. The personnel included auditors, engineers, engineering technicians and attorneys with extensive expertise in environmental restoration and waste management for Government agencies, including DOE.

The OMB/Corps teams jointly reviewed all of the more than 2,000 ADSs in the ERWM program. The teams conducted in-depth interviews with DOE federal employees and contractors at each site to validate all information related to the ADSs and to obtain backup data for costs. In some cases, additional information was provided following the site visits to assure a complete analysis. However, due to the schedule constraints of the project, the Corps selected cost data from 55 ADSs totaling \$0.962 billion or 18 percent of the ERWM budget request. An additional 181 ADSs were also reviewed in detail to assess DOE's cost estimating and accounting procedures over a broader range of the program.

The joint OMB/Corps findings were reported to a senior interagency review panel which included the DOE, the EPA, the OMB, the Department of the Army, the Department of Justice, and the Department of Defense. Although there was a wide variety of professional expertise and agency perspectives represented on the teams, there were only a few cases where there were any professional differences of opinion that could not be resolved. In these cases, the differing views were presented to the panel for resolution.

Methodology

For FY 1993, DOE developed three funding levels for the ERWM program: \$6.7 billion for the unvalidated field estimate (preliminary estimates provided by the Field Offices in order to construct a 5-year budget plan for full implementation of desired ERWM activities); \$5.8 billion for the Program Planning Level (PPL)(the amount identified by DOE in a September 4, 1991 report as necessary to meet all legal requirements, DOE orders and discretionary activities); and \$4.7 billion for DOE's budget request to OMB.

The analysis was based primarily on the unvalidated ERWM field estimate since this was commonly the only funding level for which backup data on costs was available during the site visits. The 236 ADSs included in the cost analysis covered the four major categories of ERWM program activities: environmental restoration, waste management, corrective activities, and technology development. These represented large construction projects, environmental restoration assessments, typical waste management activities and program-wide ADSs.

The 55 project ADSs selected for the comparative cost analysis were those with large dollar values and represented all ERWM program activities. The ADSs included projects (e.g., money requested for a specific site activity) and prorated amounts from selected program-wide ADSs (e.g., project management) which covered site-wide activities whose costs were not assigned to a single project.

Overhead. -- The term "overhead" is sometimes used narrowly as a measure of a profit margin built into a price of a good or service. Overhead can also be interpreted more broadly to include the cost of any activity that does not yield a tangible result in the manufacturing of a product or provision of a service. For the kinds of projects analyzed in this study, if overhead is used in this broader context, it would include the cost of project management, supervision of construction at a construction site, the prorated cost of the administrative functions of the supervising agent, as well as contractor profits (or overhead more narrowly defined). It is clear in the letter which initiated this study that the IAG should address the broader range of overhead issues, and in the remainder of this report, the term overhead should be understood in that context.

One difficulty in comparing DOE activities with "comparable" Corps projects is that certain programmatic activities associated with the management of radioactive wastes may result in higher overhead costs, that derive from additional regulatory requirements. Nonetheless,

there are many similarities in the planning, design and construction phases of hazardous waste and radioactive waste management units and the Corps has extensive experience in hazardous waste management and construction. Some of DOE's base costs, such as physical and security requirements unique to the nuclear weapons manufacturing and radioactive waste clean up were excluded from the analysis.

Analysis of DOE Costs. -- Estimates were derived for direct project costs and total overhead for ADS projects. Overhead was subdivided into three categories: project management, program direction/contractor oversight and contractor overhead. (Contractor oversight is the same as the Corps Supervision and Administration (S&A).) The steps taken in the analysis were as follows:

- Direct project costs (commonly defined by the Corps to include labor, equipment, and material necessary to perform a task) were assumed at most sites, to be those stated by DOE personnel. Exceptions to this assumption are noted and explained in the site chapters.
- The remaining amounts included in project ADSs were considered as support costs and included in the overhead comparison with Corps equivalent projects, except that:
 - Costs for base service and landlord functions such as security and safeguard measures for the site and other general facility and grounds maintenance activities, were subtracted from project costs. The Corps normally builds facilities at sites where such services are already provided by the installation. Corps project cost estimates therefore do not include the expenses related to these activities unless construction of the facility creates additional operational costs.
 - Amounts for contingencies and escalation were separately analyzed.
- A proportionate amount of program-wide ADS costs were added to the project overhead costs. The review of program-wide ADS's showed that these costs fall primarily into the categories of project management and program direction. Without program-wide ADSs, some portion of these costs might have been included in the project ADSs as direct costs. The activities which are included in the program-wide ADS's nonetheless fall into the broad definition of overhead used in this report.

Comparison to Corps Costs. -- Based on DOE's direct project cost for a given ADS, standard rates that typically are applied to Corps projects were used to determine the amount for each cost category. These percentages are shown in Figure 1. In a few cases, as noted in the site chapters, the application of normal Corps contingency factors was not appropriate and the DOE contingencies were assumed to be valid. The percentages used to calculate government labor include base pay plus fringe benefits, technical indirect (technical office overhead), and general office overhead. Figure 2 provides an example of applying Corps rates to a proposed design and construction project at Idaho. Figure 3 shows a comparison of differences between DOE and Corps contracting costs.

Figure 1

**Standard Corps Percentages
Applied to Project Costs**

1. This section explains the methodology used to compare Corps comparable hazardous waste costs (by OMB category) to DOE project costs by using DOE direct costs.
2. Use of appropriate Corps overhead rates to determine Corps comparable hazardous waste project costs:
 - A. Assume the Corps direct cost is equal to the DOE direct cost.
 - B. Develop the Corps overhead cost for each OMB category by applying the appropriate following percentages to direct costs from paragraph (2A):
 - 1) **Project management:** four percent
 - 2) **Program direction:**
 - Design:** 10 percent
 - Construction:** Eight percent for buildings and 12 percent for hazardous and radioactive waste
 - 3) **Contractor overhead with profit:**
 - Design by A-E:** 152 percent
 - Design by Corps:** 127 percent
 - Construction of a building:** 20 percent
 - Hazardous and radioactive waste clean-up:** 40 percent
 - Drill wells:** 25 percent
 - 4) **Headquarters program:** zero percent
 - 5) **Base services:** zero percent

Figure 1 (continued)

Standard Corps Percentages
Applied to Project Costs

6) Support: zero percent (added to direct cost)

C. Obtain a total project cost by adding the direct cost from paragraph 2A and the Corps calculated overhead costs developed in paragraphs 2B.1 through 2B.6.

D. Calculate escalation cost to FY 1993 by applying the OMB escalation factor of 4.1 percent to the total in paragraph 2C.

E. Obtain the FY 1993 project cost by adding paragraphs 2C and 2D.

F. Calculate project contingency on construction by applying the following rates to the cost obtained in para 2E:

Buildings: 5-10 percent

Hazardous and radioactive waste: 15-35 percent

G. Establish a total of 100 percent project cost (to include escalation and contingency) by adding the costs in paragraphs 2E and 2F.

H. Establish a percentage for each OMB category by dividing each category cost by the project total (100 percent) cost from paragraph 2G.

Figure 2

Sample Calculation Comparing DOE Costs with Corps Costs

ADS 1004-C1, High Level Waste Tank Farm Replacement-Phase I, Idaho Operations Office

The following calculation, based on percentages shown in Figure 1, illustrates how costs were derived for overhead, contingency, and escalation for comparison to DOE costs for the same categories. ADS 1004-C1 would involve the design and construction of a facility to replace several large high level radioactive waste tanks. Estimated costs for this ADS were based on information from a conceptual cost estimate summary and data provided by DOE site personnel. After distributing the program-wide ADS costs for overhead, the DOE project cost was estimated at \$69.65 million. It was assumed that the DOE direct costs of \$24.03 million were appropriate.

Cost Category	Amount (dollars in thousands)
---------------	----------------------------------

<i>Direct Costs</i>	24,030
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Direct costs for DOE were determined to be
\$22,107 for construction and \$1,923 for design.
These costs were used as a basis for development
of total Corps costs of \$24,030 ($\$22,107 + \$1,923$).

<i>Project Management</i>	961
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Corps Project Management costs were assumed to be
4% of the direct cost of a project. Therefore,
Corps Project Management costs were \$961 (4% of \$24,030).

Figure 2 (continued)

Sample Calculation Comparing DOE Costs with Corps Costs

Cost Category	Amount (dollars in thousands)
---------------	----------------------------------

<i>Program Direction and Contractor Oversight.....</i>	1,960
--	-------

Standard Corps percentages established for Program Direction/Contractor Oversight were 10% for design, 8% for building construction, and 12% for Hazardous, Toxic and Radioactive Waste (HTRW) construction. However, since the tanks are basically vertical structures, the 8% was applied to the construction dollars and 10% to the design dollars. The cost for this category amounted to \$192 (10% of \$1,923) for design, and \$1,768 (8% of \$22,107) for construction for a total of \$1,960.

<i>Contractor Overhead.....</i>	7,344
---------------------------------	-------

Standard Corps percentages used for Contractor Overhead (including profit) were 152% for design by (A-E) firm, 127% for in-house design by Corps, 20% for building construction, 40% for HTRW cleanup construction, and 25% for well drilling. For this project, it was assumed the design would be accomplished by A-E, and construction of the tank structures would be similar to building construction. The cost for contractor overhead therefore amounted to \$2,923 (152% of \$1,923) for design, and \$4,421 (20% of \$22,107) for construction for a total of \$7,344.

<i>Total Corps Project Cost.....</i>	34,295
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The total Corps project cost including direct costs and overhead-related costs amounts to \$34,295 (24,030 + 961 + 1,960 + 7,344).

Figure 2 (continued)

Sample Calculation Comparing DOE Costs with Corps Costs

Cost Category	Amount (dollars in thousands)
---------------	----------------------------------

Escalation.....	1,406
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Escalation costs were assigned at 4.1% for FY 1993.
This amounted to \$1,406 (4.1% of \$34,295).

<i>Escalated Corps Project Cost</i>	35,701
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The total Corps project cost including escalation is
\$35,701 (\$34,295 + 1,406).

<i>Contingency</i>	5,355
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Standard Corps percentages used for contingencies were
5-10% for building construction and 15-35% for HTRW
construction. Contingencies of 15% were used for construction
of the tanks as a result of discussions with site personnel and
professional judgment. This amounted to \$5,355 (15% of \$35,701).

<i>Corps Total Project Cost</i>	41,056
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The Corps total project cost including contingency
and escalation is \$41,056 (\$34,295 + \$1,406 + \$5,355) for this
example. The DOE cost of \$69,653 is approximately 70% higher
than the comparative Corps cost.

Figure 3

**Comparison of Differences
Between DOE and Corps Contract Methods and Costs**

Activity	Method		Cost	
	DOE	Corps	DOE	Corps
Contract Development and Administration	M&O Employees	Government Employees	M&O Salaries + 250%	Government Salaries + 130%
Contract Cost for Design and Construction	M&O Subcontractor	Fixed Price Contract	Contract Cost + up to 15%	Contract Cost
Additional Subcontracting (Layering)	Subcontractor to M&O Subcontractor	None	Additional 15% for Each Layer	None

Conclusion: Higher M&O markups increase the project cost by 20 to 25%.

Summary of Results

The joint OMB/Corps teams conducted this work concurrently during a relatively short period of time. As a result, the methods used to review and analyze costs varied slightly. At Chicago and Nevada, direct costs for the Corps comparable projects differed from the DOE direct costs, because sufficient backup data existed to develop an independent estimate. At Fernald and Richland, total indirect costs were estimated. Moreover, the methodology used at these two sites was sufficiently different from the others to preclude a direct comparison of results.

The aggregate results of the analysis of overhead costs for specific ADSs are summarized in Table 1. This shows that for the \$962 million portion of the ERWM program included in this analysis, there is a \$284 million (42 percent) difference between the DOE cost estimates and the estimates obtained using Corps factors. The differences in the category of overhead (\$243 million) was 85 percent of the total difference. In the aggregate, DOE estimates of contingency exceeded the Corps amounts by \$24 million. Costs attributable to price escalation were \$18 million greater when the DOE rates were applied.

Table 2 shows the OMB/Corps results by site. The differences between the Corps and DOE costs ranged from five percent at San Francisco to 49 percent at Chicago. Other site differences were distributed between 14 and 48 percent. The Corps estimate of contingencies exceeded the DOE amounts by a small amount at two sites -- Albuquerque and Savannah River. (Table 2 does not show this difference because of rounding.) The disparity of site results highlights the difficulties in developing precise estimates in a relatively short period of time. Nonetheless, the conclusions are generally consistent across all sites.

In addition to the quantitative results contained in Tables 1 and 2, the teams' analysis included observations of the methods and procedures used by DOE to manage its programs, estimate its costs and develop its budget. These observations formed the basis of the general findings discussed in the Executive Summary and the specific findings included in the site chapters. Figure 4 summarizes the observations of the inspection teams by site. The observations which collectively led to the four major findings were as follows:

Major Finding: "DOE lacks a standardized cost estimating system and procedures to prepare budget estimates and apply escalation and contingency factors and overhead rates."

Basis of Finding:

1. Variability in accounting and cost estimating systems and procedures to prepare budget estimates, track cost and schedule changes, and apply contingency and escalation factors.

2. Lack of backup data to support cost estimates.
3. Remedial design precedes the Record of Decision by one or more years and may result in unnecessary project costs.

Major Finding: "DOE contracting procedures incur higher costs."

Basis of Finding:

4. Lack of competition for design and construction contracts tends to increase cost.
5. DOE contractors commonly apply higher labor and overhead rates than Corps contractors.

Major Finding: "Available federal staff to prepare and review technical documents and cost estimates is insufficient to estimate project costs accurately."

Basis of Finding:

6. Insufficient federal expertise to prepare and review technical documents and cost estimates.

Major Finding: "Project costs are not adequately linked to the budget request."

Basis of Finding:

7. Redundant reporting of environmental activities in more than one ADS.
8. Some ADSs are overstated by including costs for completed or cancelled work and no reductions for carryover funds.

As Figure 4 illustrates, not all observations were made at all sites. The two problems that were universally observed were the variability in cost estimating and accounting systems and insufficient federal expertise at the sites. The lack of backup data was also prevalent. Specific problems such as : design preceding the Record of Decision by more than one year; redundant reporting of environmental activities; and including costs for completed or cancelled work, were not observed at all sites.

Table 1

Comparative Summary of DOE and Corps Costs
(dollars in millions)

Category	DOE Cost (\$)	DOE (%)	Corps Cost (\$)	Corps (%)	Percent Difference
Direct Costs	411	43	412	61	0
Overhead	417	43	174	26	139
Contingency	92	10	68	10	36
Escalation	43	4	25	4	70
Total	962	100	678	100	42

- This table represents a sampling of costs from 55 project ADSs, including distributed costs from program-wide ADSs that represent activities involving environmental restoration, waste management and corrective action at eight Field Offices.
- OMB overhead categories for HQ Program Direction and Support are not included in this analysis to provide a more realistic comparison to the Corps.
- Numbers do not reflect the totals shown due to rounding.

Table 2

Comparative Summary of DOE and Corps Costs
by Field Offices
(dollars in millions)

Site	Direct Cost		Overhead		Contingency		Escalation		Total	
	DOE	Corps	DOE	Corps	DOE	Corps	DOE	Corps	DOE	Corps
Albuquerque	84	84	69	18	15	15	10	4	178	121
Chicago	9	9	10	5	2	1	1	1	23	15
Idaho	64	64	46	26	28	10	5	4	143	103
Nevada	16	17	11	6	6	2	1	1	33	26
Oak Ridge	31	31	15	6	10	8	3	2	59	46
Rocky Flats	4	4	2	1	1	0.4	0.1	0.2	7	6
San Francisco	13	13	6	5	3	2	2	2	23	22
Savannah River	191	191	258	107	28	28	20	12	496	339
Total	411	412	417	174	92	68	43	25	962	678

- This table represents a sampling of costs from 55 project ADSs, including distributed costs from program-wide ADSs involving environmental restoration, waste management and corrective action.
- OMB overhead categories for HQ Program Direction and Support are not included in this analysis to provide a more realistic comparison to the Corps.
- The direct costs were assumed to be the same except for Chicago and Nevada where sufficient backup documentation was provided to derive a Corps estimate.
- Numbers do not reflect the totals shown due to rounding.

Figure 4

**Distribution of Findings
Presented to the
Senior Interagency Review Panel**

Site	1	2	3	4	5	6	7	8
Albuquerque	X	X		X	X	X	X	X
Chicago	X	X		X	X	X	X	X
Fernald	X	X	X	X	X	X		
Headquarters	X	X		X	X	X	X	
Idaho	X					X	X	
Nevada	X	X		X	X	X		X
Oak Ridge	X	X	X	X	X	X		X
Richland	X	X		X		X		
Rocky Flats	X	X	X	X		X	X	X
Savannah River	X	X			X	X	X	X
San Francisco	X	X	X	X	X	X		

1. *Variability in cost estimating and accounting systems and procedures to prepare budget estimates, track cost and schedule changes, and apply contingency and escalation factors.*
2. *Lack of backup data to support cost estimates.*
3. *Remedial design precedes the Record of Decision by one or more years and may result in unnecessary project costs.*
4. *Lack of competition for design and construction contracts tends to increase cost.*
5. *DOE contractors commonly apply higher labor and overhead rates than Corps contractors.*
6. *Insufficient federal expertise to prepare and review technical documents and cost estimates.*
7. *Redundant reporting of environmental activities in more than one ADS.*
8. *Some ADSs are overstated by including costs for completed or cancelled work and no reductions for carryover funds.*

Albuquerque Field Office

Results in Brief

Remedy Selection. -- Most remedies identified for budgeting purposes were found to be reasonable. ER remedies were not based on specific legal requirements, while many WM activities were because the latter involved the operation of existing permitted, treatment, storage and disposal (TSD) facilities.

Cost Estimating and Accounting. -- The cost estimating and accounting practices for ERWM activities are the major weaknesses found. These included: failure to follow DOE cost estimating guidance at Los Alamos National Lab (LANL); use of incorrect rates and factors; incorrect calculation of rates and factors; excessive design and construction management costs; excessive full-time equivalent (FTE) costs; inadequate review of cost estimates and budget submissions by DOE personnel; incomplete or nonexistent documentation of the cost basis for certain activities; and inability to track actual costs at the same level of detail as the cost estimates.

Process

Prior to the visit, a list of ADSs chosen for review was forwarded to the Albuquerque Field Office. These ADSs were selected on the basis of remedy, cost, and location of the activity. The OMB/Corps team divided into four subteams.

- One subteam (five persons) worked jointly with OMB to conduct interviews with DOE and contractor personnel to determine the legal basis for all ADSs.
- The second subteam (one person) interviewed DOE and contractor personnel concerning the technical remedies assumed in 43 ADSs. These ADSs were selected from 136 ADSs that had been identified as having remedies associated with the FY 1993 budget request based on a prescreening of all ADSs prior to the visit.
- The third subteam (three persons) interviewed site and field office Finance and Accounting (F&A) personnel concerning the M&O contractors' accounting and estimating system. Six categories of overhead-related costs (such as project management) and other costs (such as contingency and escalation) were identified for 10 ADSs and analyzed for adherence to and application of the accounting, estimating, and budgeting procedures. Time constraints precluded a detailed audit, but identified estimating and accounting system weaknesses.

- In a separate analysis, a fourth subteam (two persons) reviewed the cost basis for 17 ADSs in detail with the responsible DOE/contractor project managers to determine whether or not the estimate was reasonable.

Specific Findings

Remedy Selection. — Prescreening of the ADSs identified 136 as having remedies associated with the FY 1993 budget request. "Remedy" in this instance was defined as any activity which physically did something with hazardous/radioactive waste. This broad definition allowed consideration of many WM activities such as waste storage, transport, and disposal. Of 43 ADSs reviewed, 22 were found to have legally required remedies. None of the remedies were found to be unreasonable in approach. For 21 ADSs, there are reasonable alternatives to the remedies selected for costing. However, in most cases, the selected remedy was chosen on the basis of its ability to meet legal cleanup requirements and low(est) cost. Tables 1, 2 and 3 summarize these results.

Cost Estimating and Accounting Practices. — After becoming familiar with the accounting practices at LANL, Sandia National Lab-Albuquerque (SNLA), and the Waste Isolation Pilot Plant (WIPP), 10 ADSs (1267, 1220, 1312, 1326, 3200-A, 2106, 2107, 3088, 4138 and ALWP-3234) were reviewed for cost and accounting practices. The percent of spending for each of six categories of cost at these sites was determined. Table 4 shows the actual percentages for these ADSs. A comparison to typical Corps rates for these categories of cost can be found in Table 5. As this table shows, DOE costs were estimated to be 48 percent higher than costs for comparable Corps projects. Overhead activities were 295 percent higher for DOE. This difference is almost entirely attributable to differences in contractor overhead.

In addition, cost estimates for 17 ADSs were reviewed and, as explained below, nine of these estimates were determined to be unreasonable (Table 6). There are several indicators regarding the inadequacy of the DOE review of cost estimates and ADSs. Three ADSs at LANL had cost estimates which did not follow site DOE guidance (Memo, "Cost Estimating Guidance for General Plant Project (GPP) and Line Item Project (LIP), July 26, 1990") on the cost to be used for estimating the construction costs per square foot for warehouse and office space. This guidance specified \$140 per square foot for warehouse space and \$190 for office space. These findings are summarized in Table 7. If these structures were priced according to the Los Alamos "Cost Estimating Guidelines", estimates would be reduced by \$8.8 million.

Another indicator was the presence of errors in the estimates. For example, ADS 4155 funds the construction of an incinerator ash solidification building for the vitrification of contaminated ash at LANL. Although the glass melting furnace for this facility was identified in the request for capital equipment funds, the facility was not included in the detailed cost estimate.

Table 1

DOE Assumed Remedy Analysis Findings
Environmental Restoration

ADS No.	Remedy Required by Laws		Other Possible Alternative(s)		Reasonable Alternative	
	Y	N	Y	N	Y	N
PP-1001	Y			N	Y	
IT-1014		N	Y		Y	
IT-1016		N	Y		Y	
IT-1019		N	Y		Y	
KC-1030-A		N	Y		Y	
LA-1063	Y		Y		Y	
LA-1067		N	Y		Y	
LA-1170		N		N	Y	
PX-1236	Y		Y		Y	
UM-1332-B		N	Y		Y	
SL-1317		N	Y		Y	
UM-1337-B		N	Y		Y	
UM-1354-B		N	Y		Y	
LA-2121		N		N	Y	
LA-2122		N		N	Y	

Table 2
DOE Assumed Remedy Analysis Findings
Waste Management

ADS No.	Remedy Required by Laws		Other Possible Alternative(s)		Reasonable Alternative	
	Y	N	Y	N	Y	N
LA-3056		N	Y		Y	
LA-3079	Y			N	Y	
LA-3084	Y			N	Y	
LA-3088	Y		Y		Y	
SA-3183		N		N	Y	
SA-3193-A	Y			N	Y	
SA-3200-B	Y			N	Y	
SA-3200-C		N		N	Y	
SA-3200-E	Y			N	Y	
SA-3202-B	Y			N	Y	
SA-3202-C	Y			N	Y	
SA-3203	Y			N	Y	
SA-3204-A	Y			N	Y	
SA-3204-B	Y			N	Y	
SA-3223-A	Y			N	Y	
LA-3256	Y		Y		Y	
LA-4114	Y			N	Y	
LA-4132		N	Y		Y	
LA-4133		N	Y		Y	
LA-4137	Y			N	Y	
LA-4139	Y		Y		Y	
LA-4146	Y			N	Y	
LA-4151		N	Y		Y	
LA-4154		N	Y		Y	
LA-4155		N	Y		Y	

Table 3

**Assumed Remedy Analysis Findings
Corrective Activities**

ADS No.	Remedy Required by Laws		Other Possible Alternative(s)		Reasonable Alternative	
AL-	Y	N	Y	N	Y	N
LA-42		N	Y		Y	
LA-80	Y			N	Y	
SA-100	Y			N	Y	

In some cases, the dollars shown on the ADS did not match the spending profiles developed as part of the cost estimate. ADS 42, which funds the construction of a Hazardous Waste Treatment Facility at LANL, contained \$6 million in operating funds for FY 1992, even though the project was in the design/construction phase, not the operating phase. The project manager could not identify the source of the request for the \$6 million. Despite the inclusion of \$6 million in the 1992 ADS, the funds were never received and design efforts for this facility are continuing in FY 1992 using carryover funds from FY 1991. Since no new funds were obtained in FY 1992, the FY 1993 ADS included an amount designed to put the project back on track. In conversations with site personnel, DOE indicated that ADS 3193A (SNLA) included \$200,000-\$220,000 per year in FYs 1995-97 in GPP funds which had not been requested by the field technical managers. The Review Team was also told that ADS 3193A included funds for activities already covered in ADS 3100 for FYs 1994-97.

At LANL, ADS 4114 requested \$1 million in GPP funds for the Low-Level Radioactive Liquid Waste Treatment plant. The plant manager had a list of projects which may be required in the next several years, but had no costs for any of these projects. The \$1 million figure budgeted (along with \$200,000 in another ADS) represented the maximum amount that could be requested without becoming a Line Item Project (when this threshold is reached, more detailed justification is required). ADS 3079 (Mixed Low-Level Waste Storage Operations) at LANL requested \$1.4 million for the construction of mixed low-level waste facilities (shafts, fabric domes, storage sheds). The technical manager had some historical costs for certain items and FTEs but no detailed cost estimate could be produced.

Table 4

Site Cost Element Breakdown
(dollars in thousands)

Category	LANL		SNLA		WIPP		Overall	
	\$	%	\$	%	\$	%	\$	%
Project Management	122	1.3	1,156	6.5	6,464	4.3	7,742	4.3
Program Direction	1,262	13.4	498	2.8	--	--	1,760	1.0
Contractor Overhead	1,177	12.5	4,178	23.5	54,540	36.0	59,895	33.6
Subtotal	2,562	27.2	5,831	32.8	61,004	40.3	69,397	38.9
Direct Cost	5,114	54.3	9,547	53.7	69,433	45.9	84,094	47.1
Contingency	1,573	16.7	1,635	9.2	11,367	7.5	14,575	8.2
Escalation	170	1.8	765	4.3	9,494	6.3	10,429	5.8
Total	9,419	100.0	17,778	100.0	151,298	100.0	178,495	100.0

Many ER ADSs at LANL used a figure of \$220,000/FTE for estimating purposes. This figure was used in ADS 1067 for the contract construction workers building the mixed waste storage/disposal facility pursuant to the Resource Conservation and Recovery Act of 1976 (RCRA). This figure appears excessive. The Corps generally uses a figure of approximately \$100,000/FTE for "ball park" estimates. If the lower figure were used, the FY 1993 estimates would be reduced by \$5.5 million.

Table 5

DOE versus Corps Costs for Cost Elements
(dollars in thousands)

Overhead Category	DOE Cost (\$)	DOE (%)	Corps Cost (\$)	Corps (%)	Percent Difference (1)
Project Management	7,742	4.3	3,363	2.8	130.2
Program Direction	1,760	1.0	4,180	3.4	-137.5
Contractor Overhead	59,895	33.6	10,008	8.3	498.5
Subtotal	69,397	38.9	17,551	14.5	295.4
Direct Cost (2)	84,094	47.1	84,094	69.6	--
Contingency	14,573	8.2	15,057	12.5	-3.3
Escalation	10,429	5.8	4,171	3.4	150.0
Total	178,495	100.0	120,873	100.0	47.7

(1) Difference between DOE and Corps estimates as a percent of Corps estimate.

(2) Direct costs have been assumed to be the same.

The one ADS reviewed (1354B), subject to the Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA), contained reasonable estimates of the construction costs for the remediation of 4.1 million cubic yards of uranium mill tailings. A contractor's profit of 10 percent was added to the \$46 million construction cost for this project. A more reasonable profit margin for a project of this size is six percent. This same project also had excessive management and design/engineering costs. Without contingency or escalation, these two elements of cost were slightly more than 50 percent of the construction cost. A more reasonable figure would be 25 percent. Use of more reasonable factors would result in a reduction of \$13.3 million. ADS 1030A at the Kansas City site also contained excessive design, management and construction costs for the remediation of a small PCB contaminated area. These elements represent about 43 percent of the construction cost for this project. Also, the contingency of 30 percent applied to the Title I, II, and III services is not reasonable.

Table 6
Cost Estimate Review

Reasonable ADSs	Unreasonable ADSs
LA-3056	LA-3079
SA-3200C	LA-3088
SA-3200E	LA-4155
LA-1170	KC-1030A
PX-1236	SA-3193-A
UM-1332B	LA-1067
LA-2122	LA-4114
SA-100	UM-1354B
	LA-42

Table 7
DOE Rates for Warehouse and Office Space

ADS	Warehouse	Office
LA-42	\$310	\$185
LA-3256	\$436	N/A
LA-4155	\$363	N/A

The final specific finding concerns a number of items found wrong with the accounting practices at LANL and SNLA. The Cost Accounting Disclosure Statement at LANL has not been updated since 1989. Further, at LANL, the cost estimates for the ER FY 1993 budget submissions used a cost per FTE figure (\$220,000) developed by the technical staff, rather than the finance staff. The finance staff did, however, provide the WM technical managers with a cost per FTE to use in their estimates. This figure was incorrectly calculated by including nonrecurring elements of cost. The M&O contract at LANL calls for a lump-sum payment to the University of California "management." There are neither any procedures in place to track the actual costs of this "management" nor any procedures to determine if payments might include reimbursement for unallowable costs or home office expense. The LANL finance staff appears to have occasionally escalated various rates while incorrectly assuming that the base was constant. Conversations with DOE and contractor managers indicated that activities are occasionally shifted from overhead to direct charging when it appears the overhead rates are becoming "too large." This is done rather than reduce the costs of these activities.

At SNLA, no "budget call" document was prepared by the SNLA finance staff for the FY 1993 ADS budget submission. The memorandum provided to the technical managers was inadequate for their estimates as evidenced by the fact that the technical managers for one project called another site with a different M&O contractor to obtain an hourly rate/FTE for their estimate. This fully burdened rate of \$108/hr based on the other site's overhead was used without the knowledge of the finance staff. The finance staff's guidance directed that \$68/hr be used.

There is no timely and cost effective system at either site for reviewing estimates and tracking changes to the estimates due to changes in rates and factors.

Recommendations

- Government employees should review and be responsible for the cost estimates used for budget submissions. These personnel should be technically qualified in environmental and cost engineering to allow them to credibly challenge contractor estimates.
- Finance staff should develop the rates and factors used in estimates and ensure their use.
- A formalized procedure should be developed and implemented to track changes to estimates to ensure current estimates are based on the most current rates and factors.
- A comprehensive review of the estimating systems and the accounting procedures for the development of rates and factors should be conducted to identify specific weaknesses and propose corrective actions.
- M&O contract clauses for allowability of cost should be reviewed for reasonableness.

- Qualified government employees (not M&O contractor employees) should review incurred costs for reasonableness and allowability.
- HQDOE should develop consistent guidance for M&O contractors to use in the application of rates and factors.
- The cost accounting disclosure statement should be kept current.
- A standard method and format should be used for all estimates.

Chicago Field Office

Results in Brief

Of the seven ADSs reviewed for cost and overhead procedures, only two had sufficient detail to compare costs and only one (ADS CH-6002-EX) had sufficient cost back-up data. Other ADSs reviewed were poorly planned and reflected an undetermined level of effort as the basis for the FY 1993 baseline estimate.

The review found that DOE contracting procedures include substantial subcontracting and layering of contractors. There was a tendency to perform technical reviews by contract, and in some cases, with firms that have a corporate association with the design contractor. This resulted in inadequate direct supervision of the contractors and of their technical design work by DOE personnel. In some cases, a subcontractor who had no direct contractual relationship to DOE, performed work for a prime contractor. This procedure provides little direct government supervision and may result in increased overhead, profit, and management costs. The analysis revealed that DOE costs were higher than Corps costs for several items, particularly in the overhead categories.

A summary of DOE and Corps costs reviewed in detail for two ADSs is shown in Table 1.

Process

The Corps provided DOE site personnel with a list of 10 ADSs and specific questions for review in advance of the inspection. These ADSs were selected on the basis of high dollar value and differences between unvalidated field estimates and the validated target levels. Seven of these ADSs were examined in detail for cost because these had sufficient detail for analysis. Interviews were conducted with both contractor and DOE personnel in Chicago regarding the preparation of cost estimates.

Specific Findings

Contractor Oversight -- A briefing was provided by the Chicago Field office's Counsel concerning the basic organization and operation of the Chicago Field Office. The briefing showed that all lab sites (e.g., Argonne, Battelle, and Brookhaven), reviewed as part of the Chicago Field Office were each run and managed by a single prime contractor, who worked under the supervision of DOE staff. Each contractor is responsible for its respective field site and each executes its own design, technical, and remediation support contracts, as required. As

Table 1

Summary-Chicago
Roll-up of ADS's CH-2011-AA, CH-6002-EX
(dollars in thousands)

Overhead Category	DOE Cost (\$)	DOE (%)	Corps Cost (\$)	Corps (%)	Percent Difference
Project Management	3,411.0	14.8	355.2	2.3	860.3
Program Direction	1,164.0	5.1	710.2	4.6	63.9
Contractor Overhead	5,746.0	25.0	3,551.2	23.0	61.8
Subtotal	10,321.0	44.9	4,616.6	29.9	123.6
Direct Costs	9,212.0	40.1	8,878.0	57.5	3.8
Contingency	2,187.0	9.5	1,404.8	9.1	55.7
Escalation	1,277.0	5.6	553.3	3.6	130.8
Total	22,997.0	100.0	15,452.7	100.0	48.8

• The difference between DOE and Corps estimates is expressed as a percent of the Corps estimate.

a result, it appeared that there was inadequate direct supervision by DOE of the technical design work. The review team concluded that this procedure of having subcontractors execute the DOE projects, with no direct contractual relation to DOE, was a primary factor for high DOE overhead in reviewed ADS.

Interviews were also conducted with the Chicago Field Office's contracting staff to obtain data on the main contractors utilized for DOE projects. The interview showed that these same firms were, on occasion, utilized to review each other's work. In one example, a firm was utilized to design a project and then, its corporate associate was contracted to perform the DOE review of the project. This practice is not likely to provide the objective review that DOE personnel would be able to supply.

ADS CH-6002-EX -- Laboratory Decommissioning Project. Because the ADSs contained incomplete descriptions of the proposed projects, the analysis in this report is based on data obtained during the site interview. The Corps reviewed the only information available at the

time of the site visit; no back up documentation was available for either the unvalidated field estimate, the PPL, or the budget request to OMB. Battelle Memorial Institute, Columbus, Ohio, is a research facility performing work for a variety of clients. Historically, the facility performed a large amount of nuclear research for DOE and predecessor agencies. Although no longer performing research for DOE, the facility has maintained its Nuclear Regulatory Commission (NRC) license and performs monitoring and surveillance activities at two radioactively contaminated areas -- nine buildings adjacent to the Ohio State University campus and six buildings located 15 miles from Columbus, in the City of West Jefferson. Battelle, DOE, and the NRC have agreed that these sites will be decontaminated to levels that would allow future use without radiological restrictions. Most of the contamination is low-level radioactivity. The objectives are to decontaminate the buildings and grounds to levels which will allow the use or sale of the property without radiological restrictions. All generated waste will be disposed at another DOE facility.

When an agreement was reached to decontaminate the site, DOE agreed in a letter to Battelle to provide funding for this project. Battelle included DOE's letter and milestone schedule in a draft plan sent to NRC. NRC has not formally approved the decommissioning plan, although they have directed Battelle to meet the baseline schedule in the plan.

A baseline cost estimate was established with approximately 2,500 individual tasks. Each task was estimated and the contingency was established based on its uncertainty. A complete estimate was established from the bottom up and contractor rates were audited by the Defense Contract Audit Agency (DCAA) and reviewed by DOE. DOE and contractor personnel will be on-site in an oversight role during implementation.

Battelle is the prime contractor for the work and approximately 30 to 40 percent will be subcontracted. Battelle is also funding, on a cost-sharing basis, 10 percent of the cleanup costs since some contamination was the result of non-DOE research. The cost estimate does not include any profit or fees for Battelle.

This ADS provides an example of the type of backup documentation necessary to determine project requirements. Project requirements were clearly established, priority was determined, baseline schedule and costs were generated and reviewed, consequences of reducing/delaying were identified and the associated risks were identified. The analysis of DOE detailed cost estimates revealed that the direct costs appeared reasonable and therefore were used as the basis for the comparable Corps estimate. However, overhead, contingency, and escalation costs as shown in Table 2 still exceed those expected on Corps projects, particularly for project management.

CH-2011 -- Decontamination and Decommissioning (D&D) of the Brookhaven Graphite Research Reactor (BGRR). -- This is a multi-year activity designed to complete the D&D of the

Table 2

CH-6002-EX
Battelle Laboratories Decommissioning Project
(dollars in thousands)

Overhead Category	DOE Cost (\$)	DOE (%)	Corps Cost (\$)	Corps (%)	Percent Difference
Project Management	3,411.0	17.5	305.4	2.3	1,016.9
Program Direction	1,054.0	5.4	610.7	4.6	72.6
Contractor Overhead	4,476.0	23.0	3,053.6	23.0	46.6
Subtotal	8,941.0	45.8	3,969.70	29.8	125.2
Direct Costs	7,634.0	39.2	7,634.0	57.5	0.0
Contingency	1,904.0	9.8	1,208.0	9.1	57.6
Escalation	1,018.0	5.2	475.8	3.6	114.0
Total	19,497.0	100.0	13,287.5	100.0	46.7

• Direct costs have been assumed to be the same.

• The difference between DOE and Corps estimates is expressed as a percent of the Corps estimate.

BGRR in a phased and systematic manner. There are six subsystems scheduled for D&D: pile and biological shield (entomb); control rod driver mechanism (dismantle); experimental facilities (dismantle); external air exhaust system (dismantle); canal facilities (dismantle); buried radioactive waste piping and sample transfer tubing (dismantle).

The BGRR was retired in 1967 and placed in a safe condition for long-term storage including continuous radiation monitoring and control of access to potential radioactive areas. The reactor has been shut down since 1969, and the surrounding areas within the facility are presently used for offices and laboratories. The graphite was annealed and the fuel removed and shipped to Savannah River in 1972. The exhaust duct isolation valves were closed, the intake ducts enclosed in plywood, and a negative pressure system for the pile was installed in the east intake filter house.

In 1990, a radiation contamination survey of the building uncovered low levels of fixed contamination in several areas. These areas have been appropriately marked and where possible were removed. None of these areas is thought to pose a threat to health or safety.

Table 3 summarizes a comparison of DOE costs (based on the unvalidated field estimate) and Corps costs for this ADS. In the documentation provided by the Field Office, project management, project management costs were not separately identified. Table 3 shows that DOE overhead costs were 113 percent greater than for comparable Corps projects (primarily because of higher contractor overhead); contingencies were 44 percent higher, escalation was 234 percent higher.

ADS CH-2033-00 -- The Remedial Investigation/Feasibility Study (RI/FS) and Engineering Evaluation/Cost Analysis (EE/CA) Technical Support. -- In December 1989, EPA formally included the Brookhaven National Laboratory (BNL) on the National Priority List of Superfund sites. A Federal Facility Agreement (FFA) has been negotiated between DOE, EPA, and the State of New York for the site. An RI/FS has been initiated in accordance with the National Contingency Plan. The FFA includes 24 areas of concern divided into seven operable units (OUs) and four removal actions. This ADS supports the ER technical staff at BNL and contracts to develop documents required by the FFA. The size of staff is being increased to oversee the characterization and cleanup phases of each OU and removal action.

The FY 1993 cost estimate for ADS CH-2033-00 contains the following three elements:

- salaries for the project management staff (Brookhaven Project Management staff) (AUI contractor: 12 people = 11 engineers + 1 secretary);
- materials/supplies/travel, and overhead; and
- consultants who execute a portion of the program.

Consultant work in this ADS for FY 1993 consists of a single feasibility study for OU 4. The remainder of the Brookhaven ER program is covered in other ADSs and DOE could not provide a reason for the inclusion of this study in this ADS. The DOE program management costs include the salaries for the entire program management staff at Brookhaven.

CH-1054 & 1055 -- Rehabilitation of Building 306 and Construction of Additional Waste Storage Facilities - Argonne National Lab-East. ADS CH-1054 provides for the decontamination and rehabilitation of Building 306. ADS CH-1055 was prepared to allow construction of nearby additional waste storage buildings. Once Building 306 is rehabilitated and the other buildings are constructed, these will be used for temporary storage of a variety of wastes until these wastes are shipped to another DOE site for permanent disposal. The objective is to provide adequate space for storage of hazardous wastes, mixed wastes, and Transuranic (TRU) wastes in compliance with RCRA.

Table 3

CH-2011-AA
Decontamination & Decommissioning
of the Graphite Research Reactor
(dollars in thousands)

Overhead Category	DOE Cost (\$)	DOE (%)	Corps Cost (\$)	Corps (%)	Percent Difference
Project Management	0.0	0.0	49.8	2.3	-100.0
Program Direction	110.0	3.1	99.5	4.6	10.6
Contractor Overhead	1270.0	36.3	497.6	23.0	155.2
Subtotal	1,380.00	39.4	646.90	29.9	113.3
Direct Costs	1578.0	45.1	1244.0	57.5	26.9
Contingency	283.0	8.1	196.8	9.1	43.8
Escalation	259.0	7.4	77.5	3.6	234.2
Total	3,500.00	100.0	2,165.20	100.0	61.7

• The difference between DOE and Corps estimates is expressed as a percent of the Corps estimate.

The FY 1993 and FY 1994 estimates are based on a preliminary study provided by the DOE contractor. However, detailed schedule and cost estimates were not available at the time of the review.

It is unclear how the prerequisite activities (i.e., permitting, decontamination, reporting, administration, and contingency) will be accommodated in FY 1993. In order to manage this project effectively, consideration should be given to combining all of the activities associated with ADSs 1054 and 1055 into a single "stand-alone" ADS.

ADSs CH-1023 & 1024 – Argonne East, 800 Area Landfill. – Characterization and remediation of a french drain in a landfill.

CH-1023 -- Characterization. This project involves the collection and analysis of numerous environmental samples including soil, soil gas, and ground and surface water to determine the nature and extent of contamination resulting from prior waste disposal activities. These activities included the operation of a french drain into which approximately 30,000 gallons of various liquid wastes, including some highly toxic wastes, were poured. This study will determine the rate of movement and direction of groundwater flow and the degree of contamination of soil and groundwater. The study schedule is as follows: FY 1991 - sampling plan and approval, FY 1992 - sample collection and testing; FY 1993 - sample collection and testing; and FY 1994 - sample collection and testing.

CH-1024 -- Remediation. The data developed by ADS CH-1023 will be used to develop a remedial action plan: investigate remediation methods applicable to the contamination in the landfill; recommend the best method, with its schedule and cost; prepare complete engineering plans for the remedial work; and implement the remedial activities. The unvalidated field estimate for CH-1024 was derived by averaging the "best" and "worst" case estimates. Insufficient detail was made available to compare DOE costs to comparable Corps projects. It is unclear why ADS 1023 and 1024 are not packaged as one "stand-alone ADS, especially if cost savings are probable if the work is executed as a single effort.

Recommendations

- Detailed cost estimates should be developed based upon a definite scope of work for each ADS.
- To the maximum extent possible, the ADSs should be "stand-alone" documents that are not cross-referenced with other ADSs.
- There should be more direct supervision of contractors by DOE personnel. The use of subcontractors to perform this function should be minimized.

Fernald Field Office

Results in Brief

Limited cost backup for the FY 1993 budget was provided during the site visit. Additional cost information was provided subsequent to the site visit, with the last transmittal received two months after the visit. The estimates provided, however, were still deficient. With the time available it was not possible to validate the correctness or reasonableness of the cost estimates. The cost review focused on subactivity cost and backup, description of work being estimated, and procedures used in developing the cost estimate. Table 1 summarizes the review of the cost estimates. The cost estimates were disorganized, inconsistent, lacked detail, consisted of only a few lines of cost backup for an entire ADS, did not agree with the funds requested in the ADS, and were not well documented.

Process

The site visit focused on reviewing the legal requirements and the cost backup for the budget request for each ADS. The OMB/Corps team divided into three subteams -- two reviewed WM and ER ADSs, and the third reviewed landlord ADSs. The review process consisted of obtaining documentation for each ADS through meetings with representatives of DOE and Westinghouse Materials Company of Ohio (WMCO). The site environmental restoration, waste management and landlord budget request for FY 1993 is contained in 16 ADSs, comprising the total budget request of \$307.9 million.

The cost review focused on: a general overview of cost estimates supporting the funds requested in the ADSs, and an analysis of the cost breakdown - project management, overhead, General and Administrative (G&A) costs, fees, and site-wide costs (base services and support); contingencies; and escalation.

Specific Findings

Cost Breakdown - Analysis. -- Approximately eight weeks after the site visit sufficient information was received to analyze the direct costs, project management cost, overhead, G&A, fees and site-wide costs. Of the \$307.9 million requested by Fernald site management, the OMB/Corps analysis identified \$104.8 million as direct cost; \$96.6 million as project management, overhead, G&A, and fees; and \$106.5 million as site-wide costs. This means that for every \$1.00 budgeted at Fernald on direct labor and materials, an additional \$1.94 is budgeted for management cost, overhead, G&A, fees and site-wide costs. This amount exceeds the amounts the Corps expects to incur on construction projects.

Table 1

Cost/Budget Backup Deficiencies -- Fernald
(Requested Between October 16th and November 1, 1991)
(dollars in millions)

ADS Number	ADS (\$)	Status	Assessment
4-B1 RI/FS	40.5	Subactivity detail not consistent with numbers given to us at Fernald. Basic inconsistencies in man loading for WMCO. Detail sums to more than ADS total for WMCO.	Inconsistent backup, assumptions not spelled out, total does not agree with ADS. Request level not adequately documented.
8-B1	15.9	No backup provided on subactivities. Inadequate backup for Parson's contract (\$9.5).	Request level not adequately documented.
10-B4	16.5	Backup received and is O.K.	Backup adequate.
16-C3 WM	33.5	Cost backup does not add up to ADS total, ADS \$33,512; detail adds \$47,443.	Request level not adequately documented.
30-B1	0.5	Backup is adequate.	Backup adequate.
46-B2-OU1	15.0	Backup is \$21.7 million; ADS is \$15.0. ADS backup not appropriate for request.	Request level not adequately documented.
47-B2-OU2	15.8	Received at site.	Backup adequate.
48-B2-OU3	18.8	Cannot split out FY 1993. Subactivity detailed but not much backup and it is poorly done, many inconsistencies.	Confused, cannot be analyzed, many inconsistencies, cannot translate FEC with FY 1993 spinout. Request level not adequately documented.
49-B2-OU4	8.5	Backup provided on 12/11/91 appears to be manhour loaded to support one page estimate given on 10/24/91.	Backup adequate.

• DOE subsequently provided further documentation in late November/early December 1991. This later documentation was an improvement over the initial submittal. However, a number of deficiencies for the cost justification of various ADSs remained.

Table 1 (continued)
(dollars in millions)

ADS Number	ADS (\$)	Status	Assessment
50-B2-OU5	16.5	Cost backup does not add to \$16.5; instead, \$23.9 and it is not internally consistent. No answers to our wastewater treatment questions.	Request level not adequately documented.
52-B2	3.5	OMB questionnaire requests \$15.4 in FY 1993; DOE request \$3.6. Backup is for \$15.4 and not appropriate or relevant to official DOE request.	Request level not adequately documented.
60-D1	13.1	No cost backup provided. Described as attorney client privilege.	Request level not adequately documented.
64-D1	17.7	ADS request was for \$17.7 million. Backup was provided for \$18.2 million. Details are inconsistent.	Request level not adequately documented.
68-D1	42.8	Data provided are inconsistent; no detail.	Request level not adequately documented.
69-D1	26.4	Very limited cost backup, sums to \$31.4 or far above \$26.4.	Request level not adequately documented.
74-D2	22.8	Very limited cost backup (one page), inadequate for review. No details provided.	Request level not adequately documented.
Total	307.9		

• DOE subsequently provided further documentation in late November/early December 1991. This later documentation was an improvement over the initial submittal. However, a number of deficiencies for the cost justification of various ADSs remained.

Of the \$307.9 million, a total of \$52.8 million was categorized as project/program management. This is 20.7 percent of the remaining \$255.1 million. If WMCO project/program management could be reduced from 20.7 percent to 10 percent, the savings would be \$27.3 million. The implementation of a contract for an ERMCO on the site could result in reducing the \$39.6 million identified in the OMB/Corps analysis for subcontractor management, overhead, and fees. The ERMCO concept would consolidate the site remediation work with site management. This should result in greater control and less redundancy between contractors and lower overhead management costs. A 10 percent reduction in cost would result in a savings of \$4 million.

Escalation. -- The escalation rate is not uniformly applied and in most cases is not indicated in the cost backup data. Replies by Fernald to the OMB/Corps questionnaire state that the escalation rate used from FY 1992 to FY 1993 was 4.5 percent which is higher than OMB's guidance of 4.1 percent. If all cost estimates are currently based on FY 1992 dollars, the amount for escalation could be calculated. However, the percentage used should escalate the cost estimate from the effective date of the cost estimate (this may or may not be FY 1992) to the midpoint of the duration of the activity in FY 1993. If the activity will be ongoing for all of FY 1993, the midpoint would be April 1, 1993. The majority of the estimates did not address escalation, and those that did were not well documented on how the percentage was determined. Thus, for most of the ADSs, it is not possible to determine how much escalation, if any, was included in the ADS cost estimate.

Contingencies. -- Ten ADSs were analyzed for contingency. Only two of the 10 ADS cost estimates addressed the question of contingency. ADS 4-B1, RI/FS, has 20 percent contingency in the contractor design hours and zero percent for the remainder in FY 1993. ADS 52-B2 used zero percent for FY 1993. As for Fernald's response to the questionnaire concerning contingencies; some ADS subprojects indicated contingencies at 20 percent, whereas others indicated no contingencies.

The Fernald manual "Guidelines for Construction Estimates," dated January 1, 1991, recommends a standard contingency of 20-25 percent for budget estimates based on the Conceptual Design Report (CDR), and up to 40 percent for experimental or special conditions. These percentages appear to be reasonable for budget estimates based on CDRs. As the design progresses, the contingency should be reduced to reflect the completeness of the design. Each feature of the project should be analyzed to determine the risk of overrunning the cost estimate. Contingencies should be assigned to reflect this risk.

No contingency guideline was furnished on non-construction cost estimates. A contingency of 20 percent may or may not be appropriate for design, material cost, or base services, depending on the scope of the design, types of materials being purchased or the services being provided.

The same conclusion can be drawn for contingency application as for escalation. In the few cases where contingencies were identified, no documentation or justification was provided. If contingencies are not included in a cost estimate, the estimator should document why.

Interagency Review Panel. -- Due to the lack of cost information provided prior to the interagency review panel, November 20, 1991, the briefing focused primarily on the legal requirements for environmental remediation of the site. Budgetary cost information was provided to the OMB/Corps team while at the site for ADS 8-B1 (Project Management), ADS 60-D1, (Litigation), as well as an estimate for temporary office space. Comparative estimates were developed for several activities which appeared to be over-estimated in the budgetary estimates provided. The funds requested for these activities appear high when compared to the Corps estimates. The following findings were presented at the briefing:

Finding. -- As discussed earlier, the joint OMB/Corps review of Fernald's budget cost estimates had to be postponed because of a general lack of backup data. However, a review of a Program Management ADS disclosed probable excessive costs.

- ADS-8-B1 (Program Management) was made up of 14 subactivities totaling \$15.9 million in FY 1993. Project Management (1 subactivity) costs under the Parsons contract were selected for detailed cost review. Our review revealed:
 - DOE has approved A-E Contractor transportation costs at \$1,200 x 200 trips, \$600 x 80 trips and \$350 x 125 trips. This would average \$819 per trip for a total of \$331,750. Using the average air fare to nine major metropolitan areas both east and west coast and Florida to Cincinnati, we have estimated 405 trips x \$400 per trip or \$162,000.
 - DOE has approved 25 Computer Aided Drafting and Design (CADD) stations at \$45,000 each for a total of \$1,125,000. Our review showed that a top brand name CADD may be purchased for \$18,000 for a total of \$450,000 for 25 CADD's. DOE was not able to justify why 25 CADD's were needed.
 - DOE has approved 53,333 square feet (sf) of office space for approximately 258 A-E employees or 207 sf per employee. A reasonable standard for a location like Fernald is 153 sf per employee including file space and aisles etc., per GSA. The costs are potentially overstated by $(207-153) \times 258 \times \$15/\text{sf} = \$208,980$.
- ADS 60-D1 (Litigation) review identified an apparent excessive cost:
 - National Lead of Ohio (NLO) cost proposal for FY 1993 is \$4.6 million and includes a DOE escalation factor of 4.1 percent. DOE budgetary estimate includes an additional four percent escalation. This duplication of escalation factors and other unspecified factors raise the DOE estimate to \$5 million.

- If similar excessive costs are present in other activities, this portion of Fernald's FY 1993 funding request would not be required by either statute or DOE order.
- Another concern of potential excessive costs at Fernald involves a recently approved contract for the procurement of temporary trailer office space. Tables 2 through 4 show

Table 2
Cost Comparison
Fernald Temporary Office Space
vs.
McConnell AFB Interim Health Care Facility

Item	Fernald		McConnell AFB	
	Amount (\$)	sf Cost (\$)	Amount (\$)	sf Cost (\$)
Construction: Complete Facility In-Place Cost	1,396,500	71.25	2,400,000	75.00
Construction Management	335,160	17.10	211,200	6.60
Engineering	173,166	8.84	65,000	2.03
Project Management	190,483	9.72	60,000	1.87
Shipping	419,062	21.38	40,000	1.25
Contingency	628,593	32.07	244,000	7.63
Total Estimated Cost	3,142,964	160.36	3,020,200	94.38

- Fernald costs are based on a WMCO draft change proposal, No. 87502A, dated 10/18/91.
- Cost for McConnell AFB based on bid results, quotes, and Corps Government estimate.
- Fernald SF cost for evacuation alarm and furniture was used in the McConnell estimate.
- Construction cost for Fernald and McConnell AFB compare favorably, \$71.25 and \$75.00/SF respectively.
- Significant differences exist in construction management, engineering, project management, shipping, and contingency.
- Fernald shipping cost was computed as 20 percent of construction cost, construction management, engineering and project management. Shipping should only apply to construction cost. Also, factor of 20 percent seems high for shipping modular units.
- Haul distance used in computing the \$1.25/SF shipping cost for McConnell AFB assumes a 350 mile haul. Fernald shipping cost is 17 times higher than that estimated for McConnell AFB.

Table 3

Fernald Temporary Office Space Cost Assessment (19,600 sf)
(actual dollars)

Item	(\$)	Cost \$/sf	Assessment
Construction: Complete Facility In-Place Cost	1,396,500	71.25	Cost of trailers including site work is reasonable.
Construction Management	335,160	17.10	260% higher than McConnell AFB. (3)
Engineering	173,166	8.84	435% higher than McConnell AFB. (3)
Project Management	190,483	9.72	520% higher than McConnell AFB. McConnell AFB based on performance specification. (3)
Shipping	419,062	21.38	1700% higher than McConnell AFB. (1)(2)
Contingency	628,593	32.07	25% used by Fernald seems high considering very few unknowns in the design and construction of trailer space.
Total Estimated Cost	3,142,964	160.36	

1. Fernald shipping cost was computed as 20 percent of construction cost, construction management, engineering and project management. Shipping should only apply to construction cost. Also, factor of 20 percent seems high for shipping modular units.

2. Haul distance used in computing the \$1.25/SF shipping cost for McConnell AFB assumes a 350 mile haul. Fernald shipping cost is 17 times higher than that estimated for McConnell AFB.

3. Higher percentages for Fernald appear due to differences in management structure of DOE and the Corps.

NOTE: ● Fernald costs are based on a WMCO draft change proposal, No. 87502A, dated 10/18/91.

● Cost for McConnell AFB based on bid results, quotes, and Corps Government estimate.

● Fernald SF cost for evacuation alarm and furniture was used in the McConnell estimate.

● Construction cost for Fernald and McConnell AFB compare favorably, \$71.25 and \$75.00/SF, respectively.

● Significant differences exist in construction management, engineering, project management, shipping, and contingency.

how a square footage cost of \$71.25 escalates to \$160.36 when various overhead, contingency management and engineering fees are added. Further, it explains why this cost is excessive compared to other federal or commercial sites.

Table 4

**Cost Comparison-Leased Versus Construction
20,000 sf Office Space**

Metro Area Location	New Building Cost (\$/sf)		
	Real Estate	Building and Site Work	Total
Cincinnati	\$ 5.00	\$127.00	\$132.00
Kansas City	\$15.00	\$116.00	\$131.00
New York	\$20.00	\$156.00	\$176.00
Washington, DC	\$20.00	\$128.00	\$148.00
Fernald Trailer Office Space	No Charge	\$160.36	\$160.36

- Real estate cost is based on a two-acre site in a suburban area. The cost has been converted to a dollar per sf of building area.
- Building and site work cost includes the design cost, project management cost, site work/utilities/construction costs, construction management, real estate, and the furniture cost used for the Fernald temporary trailer space. The furniture cost used for the trailers seemed very low, \$60,000.
- As of 11/1/91, real estate cost for Washington, DC was not available. The cost used for Metropolitan New York was used for Washington, DC for this comparison.

Recommendations

- The DOE site personnel should include cost engineers and budget analysts because they do not currently have the capability available to prepare budget estimates or to review cost estimates prepared by the M&O contractor.
- DOE should take steps to increase federal control of technical reviews and contracting activities. The present system does not provide adequate technical and fiscal control of the site contractors.
- DOE should focus attention on reducing costs related to base services, support and management procedures.
- Develop procedures to prepare budgetary estimates for construction; operations and maintenance activities; manpower estimates for design cost, and management cost, etc. Procedures should also include instructions in the application of escalation and contingencies which are improperly and inconsistently applied. All estimates should be documented and organized to facilitate review. Although there is a construction cost estimating guide for preparation of construction estimates, it did not appear to be used in developing the FY 1993 budget request.

Idaho Field Office

Results in Brief

The cost backup data for the ADSs at the Idaho Operations Office was detailed and supported the unvalidated field estimate budget level. Less detailed backup data was also available to support the Program Planning Level (PPL) and DOE request levels.

The analysis found that the cost accounting system is well established, escalation rates were applied consistently and in accordance with OMB guidance, and there is a good historic record of project costs. DOE relies primarily on M&O contractors to develop scopes of work and to prepare budget estimates and on independent contractors to review this information. There is, however, limited federal oversight of these activities.

The Idaho Operations Office budget includes both project specific ADSs and program-wide ADSs. The program-wide ADSs were primarily overhead and added substantially to the project costs when distributed back to the supported projects. Five project estimates were reviewed in detail. The DOE costs, including an allocated portion of program-wide ADSs, were compared to Corps projects. Table 1 shows that DOE costs are higher than comparable Corps projects by 38 percent or \$39.4 million.

For most environmental restoration activities reviewed, the budget estimates are based on excessively conservative assumptions regarding the technical scope of proposed projects.

Process

The Idaho Operations Office consists of four project offices; Grand Junction Project Office (GJPO), Idaho Chemical Processing Plant (ICPP), Idaho National Engineering Laboratory (INEL), and the West Valley Demonstration Project in New York. Each project office has a different M&O Contractor. The ICPP and INEL have environmental restoration and waste management programs. In addition, INEL has landlord ADSs. The FY 1993 funding for each program at the various project offices is shown in Table 2.

Inspection. -- OMB took the lead in answering questions regarding legal requirements and remedy selection. OMB divided into two teams to review these issues and the Corps was represented as an observer in each OMB team. The Corps took the lead in answering the cost issues and divided into two subteams. OMB was represented as an observer in each Corps subteam for a portion of the site visit.

Selection of ADSs for Cost Review. -- The review included a detailed analysis of cost data for 18 of the 127 ADSs (11 project ADSs and 7 program-wide ADSs) which had FY 1993 funding. This sampling represented 57 percent of the PPL or \$356 million as shown in Table 3. An additional 31 program-wide ADSs were reviewed in sufficient detail to characterize and distribute the overhead portion of their costs to the project ADSs. Because of limited backup data, comparisons between DOE and Corps costs were made for 5 project ADSs. The analysis included distributed costs from the 38 program-wide ADSs identified above. The project ADSs were representative of all types of proposed projects and the largest amount of estimated funding: environmental restoration assessments -- including preparation of work plans, field investigations and laboratory analyses, preparation of RI/FS reports, and performance of risk assessments; design and construction of facilities and remedial actions; and waste management operations -- the day-to-day operation of treatment plants.

Table 1

**DOE/Corps Cost Comparison
Summary of Idaho ADSs**
(dollars in thousands)

Overhead Category	DOE Cost (\$)	DOE (%)	Corps Cost (\$)	Corps (%)	Percent Difference
Project Management	4,442	3.1	2,545	2.5	74.5
Program Direction	7,274	5.1	5,471	5.3	33.0
Contractor Overhead	34,083	23.9	17,833	17.3	91.1
Subtotal	45,799	32.1	25,849	25.0	77.2
Direct Costs	63,605	44.6	63,605	61.6	0
Contingency	28,335	19.9	10,194	9.9	178.0
Escalation	4,999	3.5	3,668	3.6	36.3
Total	142,738	100.0	103,316	100.0	38.2

- This table includes costs for five project ADSs (40-E1, 1201-C1, 101-E2, 102-E2, and 1004-C1) and distributed costs from 38 program-wide ADSs.
- The difference between DOE and Corps estimates is expressed as a percent of the Corps estimate.

Table 2

Idaho Operations Office
Distribution of FY 1993 Budget By Project Office and Program

Project Office	Program	M&O Contractor	FY 1993 Funding Level (\$ in Thousands)		
			DOE Request	PPL	Unval. Field
Grand Junction	ER (1)	Chem-Nuclear/ Geotech	38,753	59,625	59,625
Idaho Chemical Processing Plant	ER	Westinghouse, Idaho	4,774	9,545	9,545
Idaho Chemical Processing Plant	WM (2)	Westinghouse, Idaho	139,787	145,313	150,583
Idaho National Engineering Laboratory	ER	E,G & G, Idaho	47,303	69,009	69,009
Idaho National Engineering Laboratory	LD (3)	E,G & G, Idaho	42,955	49,139	55,109
Idaho National Engineering Laboratory	WM	E,G & G, Idaho	128,641	156,952	168,027
West Valley Demonstration Project	WM	Westinghouse, New York	124,000	134,000	134,000
Total			526,213	623,583	645,898

1. ER Environmental Restoration

2. WM Waste Management

3. LD Landlord

Table 3

Distribution of ADSs Reviewed
(dollars in thousands)

ADS Number	ADS Title	GJPO	ICPP	INEL	West Valley	Total
40-E1	<u>ER Assessments</u> Buried Waste Program (WAG 7)			18,415		18,415
1203-C1	Waste Area Group (WAG 3)		4,570			4,570
1301-C1	Decontamination and Decommissioning Surveillance and Maintenance		200			200
14-E1	<u>Design/Construction</u> Idaho Waste Processing Facility			10,256		10,256
101-E2	Waste Characterization & Storage Facility			46,300		46,300
102-E2	Underground Storage Tanks			3,030		3,030
1004-C1	High Level Waste Tank Farm-Phase I		61,150			61,150
1202-C1	Waste Area Group 3 Cleanup		2,475			2,475
2201-GA	Grand Junction Vicinity Properties	27,604				27,604
1002-C1	<u>Waste Management Operations</u> High Level Waste Storage & Treatment Facility		23,416			23,416
4001-WV	West Valley Demonstration Project				134,000	134,000
6-E1	<u>Program-Wide</u> DOE Compliance			2,500		2,500
7-E1	Operations Support			4,000		4,000
29-E1	Technical Support & Integration			4,604		4,604
110-E1	DOE Support			6,842		6,842
1203-C1	Environmental Restoration - Project Management		1,500			1,500
1053-C1	Safety		2,800			2,800
1054-C1	Quality Assurance		2,400			2,400
	Total	27,604	98,511	95,947	134,000	356,062

• Dollar amounts shown are at the Program Planning Level (PPL).

Specific Findings

Cost Comparisons. -- Tables 4 through 8 show the cost comparisons to Corps projects for the five Idaho Operations Office projects analyzed in detail.

Overhead costs were found to be higher by 77 percent or \$20 million. This difference is attributed to the following:

- several DOE personnel responsible for supervising the drilling operations -- up to six personnel providing oversight to one drill crew;
- higher contractor overhead rates for engineering services and construction; and
- the distribution of high overhead costs from program ADSs to project ADSs for the Corps analysis.

The costs for contingency were 178 percent or \$18.14 million higher than comparable Corps projects. This difference is directly attributed to the high contingency cost on one large construction project -- ADS 1004-C1.

ID-40-E1, Buried Waste Program (Waste Area Group 7). -- The Buried Waste Program for Waste Area Group (WAG) 7 encompasses 14 Operable Units. The operable unit included in the cost analysis was the TRU-Contaminated Waste Pits and Trenches. A buried waste program strategy, work package documentation, and resource summary sheet for one portion of this operable unit were available for review. The scope of work for this effort includes the award of four contracts for drilling 45 boreholes (45 soil samples and 139 penetrometer measurements), preparation and review of pre-drilling documents, oversight of the contracts, analyzing and validating the data and preparing risk assessments.

One-third of the costs for writing reports, data evaluation and data validation were direct costs; the remaining two-thirds of costs were for contractor overhead. The average labor multiplier of three was obtained from EG&Gs rate files which have labor multipliers ranging from 2.9 to 3.14. This is higher than the Corps' labor multiplier of 2.27 to 2.52. Contractor oversight costs were primarily the tasks related to overseeing the drilling and sampling activities and the penetrometer sampling at various locations. Discussions with EG&G personnel revealed that some of the costs for FY 1993 for this particular task were incorrect and possibly high.

The base over which the program-wide ADSs were distributed is \$32.7 million at the validated target level or the sum of all INEL-ER project ADSs. This base is the difference between the total of project ADSs (\$50.1 million) and the total of program-wide ADSs (\$17.3 million). The validated target level for ADS 40-E1 is \$10.3 million or 31.5 percent of the program-wide ADSs overhead costs.

Table 4

DOE/Corps Cost Comparison
ADS 40-E1, Buried Waste Assessment - INEL
(dollars in thousands)

Overhead Category	DOE Cost (\$)	DOE (%)	Corps Cost (\$)	Corps (%)	Percent Difference (1)
Project Management	0	0	271	2.6	-100.0
Program Direction	3,692	23.4	813(2)	7.7	354.1
Contractor Overhead	4,661	29.6	2,288(3)	21.7	103.7
Subtotal	8,353	53.0	3,372	31.9	147.7
Direct Costs	6,776	43.0	6,776	64.1	0
Contingency	0	0	0	0	0
Escalation	621	3.9	416	3.9	49.3
Total	15,750	100.0	10,564	100	49.0

1. The difference between DOE and Corps estimates is expressed as a percent of the Corps estimate.
2. 12 percent of total direct costs used to calculate program direction/contractor oversight.
3. 152 percent of direct labor costs, 25 percent of direct drilling costs, and zero percent of laboratory analysis cost used to calculate contractor overhead.

Table 5

DOE/Corps Cost Comparison
 ADS 1201-C1, Environmental Restoration Assessment - ICPP (1)
 (dollars in thousands)

Overhead Category	DOE Cost (\$)	DOE (%)	Corps Cost (\$)	Corps (%)	Percent Difference (2)
Project Management	267	5.7	74	2.1	260.8
Program Direction	0	0	221(3)	6.3	-100.0
Contractor Overhead	1,515	32.4	792(4)	22.6	91.3
Subtotal	1,782	38.1	1,087	31.1	63.9
Direct Costs	1,834	39.3	1,834	52.4	0
Contingency	868	18.6	457(5)	13.1	89.9
Escalation	188	4.0	120	3.4	56.7
Total	4,672	100.0	3,498	100.0	33.6

1. Project includes evaluation of existing data, additional field investigations, assessment of risk, and feasibility studies for 78 sites at ICPP.
2. The difference between DOE and Corps estimates is expressed as a percent of the Corps estimate.
3. 12 percent of total direct costs were used to calculate program direction.
4. 152 percent of direct labor, 25 percent of direct drilling, and zero percent of laboratory costs used to calculate contractor overhead.
5. 15 percent of escalated costs used to calculate contingencies.

Table 6

DOE/Corps Cost Comparison
 ADS 101-E2, Waste Characterization and Storage Facility - INEL ⁽¹⁾
 (dollars in thousands)

Overhead Category	DOE Cost (\$)	DOE (%)	Corps Cost (\$)	Corps (%)	Percent Difference ⁽²⁾
Project Management	2,717	5.6	1,145	2.6	137.3
Program Direction	2,011	4.2	2,289 ⁽³⁾	5.2	-12.1
Contractor Overhead	7,248	15.0	6,751 ⁽⁴⁾	15.2	7.4
Subtotal	11,976	24.7	10,185	22.9	17.6
Direct Costs	28,614	59.1	28,614	64.4	0
Contingency	5,857	12.1	4,039 ⁽⁵⁾	9.1	45.0
Escalation	1,975	4.1	1,591	3.6	24.1
Total	48,422	100.0	44,429	100.0	9.0

1. Project includes construction of facilities required to support storage and characterization of stored TRU located at the Radioactive Waste Management Complex.
2. The difference between DOE and Corps estimates is expressed as a percent of the Corps estimate.
3. 8 percent of total direct costs used to calculate program direction.
4. 152 percent of total design labor and 20 percent of total construction costs used to calculate contractor overhead.
5. 10 percent of escalated costs used to calculate contingencies.

Table 7

DOE/Corps Cost Comparison
 ADS 102-E2, Underground Storage Tanks - INEL (1)
 (dollars in thousands)

Overhead Category	DOE Cost (\$)	DOE (%)	Corps Cost (\$)	Corps (%)	Percent Difference (2)
Project Management	428	10.1	94	2.5	355.3
Program Direction	361	8.5	188(3)	5.0	92.0
Contractor Overhead	648	15.3	658(4)	17.4	17.5
Subtotal	1,437	33.9	940	24.9	52.9
Direct Costs	2,351	55.4	2,351	62.4	0
Contingency	279	6.6	343(5)	9.1	-18.7
Escalation	174	4.1	135	3.6	28.9
Total	4,241	100.0	3,769	100.0	12.5

1. Project provides management and oversight for all activities associated with maintaining compliance with Underground Storage Tank regulations.
2. The difference between DOE and Corps estimates is expressed as a percent of the Corps estimate.
3. 8 percent used to calculate program direction/contractor oversight for 102-E2.
4. 152 percent of direct design labor and 20 percent of construction and other costs used to calculate contractor overhead.
5. 10 percent of escalated costs used to calculate contingencies.

Table 8

DOE/Corps Cost Comparison
ADS 1004-C1, High Level Waste Tank Farm - Phase I - ICPP (1)

Overhead Category	DOE Cost (\$)	DOE (%)	Corps Cost (\$)	Corps (%)	Percent Difference (2)
Project Management	1,030	1.5	961	2.3	7.2
Program Direction	1,210	1.8	1,960(3)	4.8	-38.3
Contractor Overhead	20,011	28.7	7,344(4)	17.9	172.5
Subtotal	22,251	31.9	10,265	25.0	116.8
Direct Costs	24,030	34.5	24,030	58.5	0
Contingency	21,331	30.6	5,355(5)	13.0	298.3
Escalation	2,041	2.9	1,406	3.4	45.2
Total	69,653	100.0	41,056	100.0	69.7

1. Project consists of design and construction of replacements for several large high level radioactive waste tanks.
2. The difference between DOE and Corps estimates is expressed as a percent of the Corps estimate.
3. 8 percent of total construction and 10 percent of direct design labor used to calculate program direction.
4. 152 percent of direct design labor and 20 percent of total construction used to calculate contractor overhead.
5. 15 percent of escalated costs used to calculate contingencies.

Other Factors Contributing to Higher Program Costs. -- The site relies primarily on the use of contractors for some inherently government functions. M&O contractors prepare project specifications and budget estimates and independent contractors review these documents. Each of these contractor activities adds to overhead costs. However, as the Corps has found, such rates may include inappropriate costs or be distributed over an inappropriate base. Without a detailed audit of accounting practices for actual projects costs incurred in prior fiscal years, it is difficult to determine if the current overhead rates paid to the site contractors are reasonable.

The analysis also found that the scope of work and the cost estimate were based on worst case assumptions. For example, the budget request assumes the maximum number of borings will be made, the maximum number of samples will be analyzed, and the largest amounts of soil or groundwater will be treated at the highest possible cost. For most environmental restoration activities reviewed, the review found that the budget request reflected an excessively conservative scenario rather than actual site conditions.

Recommendations

- The number of federal personnel with engineering and cost estimating expertise should be increased to provide more direction and guidance during project and budget formulation.
- The contracting methods and the philosophy that mandates contracting of virtually all functions should be reviewed with the goal of improving competition.
- The mechanism for budgeting and tracking project costs by ADS could be improved if all program-wide activities supporting projects were budgeted within the project rather than in various "overhead" ADSs.
- HQDOE should provide guidance to field offices to allow them to budget for something less than "worst case" in all aspects of the environmental restoration program. While any one project may need the "worst case" funding, it is unlikely that DOE nation-wide would require "worst case" funding.

Nevada Field Office

Results in Brief

The review found that DOE technical review of designs and cost estimates was lacking. The technical reviews were often contracted out and in some cases the review firm had a corporate association with the design entity. The contractor performing the work was often a subcontractor with no direct relationship to the DOE office. It appeared that DOE's practice of reliance on the use of contractors to oversee other contractors with minimal direct supervision by DOE employees increases overhead, profit, and management fees for the work being performed.

The DOE cost estimates were generally higher than the Corps' cost estimates for three ADSs reviewed in detail (see Table 1). Some ADSs were totally lacking scope, schedule, and cost information and some activities were scheduled for technology not fully developed. Backup documentation, where available, showed in these cases, that there was no baseline estimate, as yet an undetermined level of effort will be needed in FY 1993 to develop the necessary data for the estimate.

Process

The team evaluated five preselected large dollar ADSs representative of site-wide activities for the defined OMB overhead cost categories and prepared a detailed cost estimate for each ADS. In one case (NV-202-AA) the prepared estimates included changes in the DOE direct project costs since a detailed scope of work was provided.

The team reviewed the DOE cost estimates for three ADSs and compared the estimates to comparable Corps project. Two other ADSs were analyzed in order to obtain a better understanding of the cost estimating procedures.

Specific Findings

Contractor Layering-- Before the team began its review of individual ADSs, DOE representatives presented their organizational structure including the use of contractors and subcontractors for executing their workload. The briefing showed that subcontracting, even among subcontractors was a common practice. In such circumstances, total contractor overhead charged to a project is likely to be high.

ADS NV-202-AA -- Groundwater Characterization at the Nevada Test Site (NTS). -- This

activity provides the design and implementation of a comprehensive groundwater contaminant characterization program for the NTS. Table 2 shows the comparison between DOE and Corps cost estimates. Current plans call for the installation of 98 characterization wells to determine the presence, magnitude, extent, direction, and rate of movement of hazardous and/or radiological substances and wastes. The installation of these wells will be completed in three phases. Phase 1 includes the installation of 17 wells for characterization of the entire NTS. Phase 2 will be the installation of 43 additional wells. These wells plus the 17 wells from phase 1 will provide data for the characterization of five separate areas on the NTS. Phase 3 contains 38 wells to be drilled to meet EPA requirements. The Phase 3 wells will be required to further identify individual sources and plumes identified by Phase 1 and 2 wells.

The current project schedule is based on the assumption that government furnished assets will restrict drilling to a maximum of 12 wells per year. The contractor has completed one well, but it collapsed and must be redrilled. The original cost per well was exceeded by 70 percent. The unvalidated field estimate and validated target level costs were increased accordingly.

Table 1
Summary of Nevada
ADSs NV-202-AA, NV-301-AA, NV-308-AA
(dollars in thousands)

Overhead Category	DOE Cost (\$)	DOE (%)	Corps Cost (\$)	Corps (%)	Percent Difference
Project Management	0.0	0.0	663.8	2.6	100.0
Program Direction	2,184.0	6.5	1,131.5	4.4	93.0
Contractor Overhead	8,761.2	26.3	4,062.4	15.7	115.7
Subtotal	10,945.2	32.8	5,857.7	22.6	86.8
Direct Costs	15,610.0	46.8	16,737.5	64.7	-6.7
Contingency	5,546.6	16.6	2,352.2	9.1	135.8
Escalation	1,250.2	3.8	926.4	3.6	35.0
Total	33,352.0	100.0	25,873.8	100.0	28.9

• The difference between DOE and Corps estimates is expressed as a percent of the Corps estimate.

ADS NV-202-AA had detailed cost backup showing reasonable assumptions and justification for the funds requested but the details did not allow for the distribution of costs into the OMB categories. The cost estimating team made their comparisons shown in Table 2 after deriving an independent cost estimate for the drilling activity. Although the overall cost estimate for a comparable Corps project is lower than the DOE estimate, the cost review team nonetheless found that the DOE direct cost estimate was less than the Corps cost estimate because of differences in the methodologies used to obtain drilling costs.

If the project continues at the maximum 12 wells per year, the project should be 24 percent complete by end of FY 1993. It should be noted that this ADS requests 34 percent of total project funds by FY 1993. Although some of this difference would be accounted for by the inclusion of the initial design cost already in the project, insufficient detail was available to enable a complete resolution of the difference between the estimate of physical completion and the percentage of funds requested through FY 1993.

Table 2
NV-202-AA
Groundwater Characterization
for the Nevada Test Site
(dollars in thousands)

Overhead Category	DOE Cost (\$)	DOE (%)	Corps Cost (\$)	Corps (%)	Percent Difference
Project Management	0.0	0.0	570.2	2.6	100.0
Program Direction	2,184.0	7.7	855.4	3.9	155.3
Contractor Overhead	7,782.0	27.5	3,546.0	16.1	119.5
Subtotal	9,966.0	35.3	4,971.6	22.6	100.5
Direct Costs	13,264.0	46.9	14,256.0	64.7	-7.0
Contingency	3,924.0	13.9	2,001.6	9.1	96.0
Escalation	1,113.0	3.9	788.3	3.6	41.2
Total	28,267.0	100.0	22,017.5	100.0	28.4

- Direct costs were re-estimated by the cost review team from the back up data provided.
- The difference between DOE and Corps estimates is expressed as a percent of the Corps estimate.

ADS NV-301-AA -- Continuity of Operations. -- This ADS is for the following: base staff support funding to retain trained and experienced staff when generator fees are inadequate to cover staff costs; staff training; rental fees for equipment maintenance; photographic and graphics support; design and engineering support; upgrade construction of the road from the main highway to disposal sites; buildings, water lines, and fire protection; equipment replacement; maintenance projects; computer system upgrade; and, six percent levy by NTS weapons program for support services (i.e., fire protection, cafeteria, housing, guard service, power, water, roads, and new base support). Table 3 shows a comparison of DOE and Corps estimated costs for ADS NV-301-AA.

Low-level radioactive wastes have been disposed at the NTS for the past 11 years, and mixed wastes have been disposed at this facility since 1989. Wastes are expected to be received from 17 generators, 14 of which are off-site DOE facilities. Generators are responsible for characterizing wastes shipped to NTS; NTS WM is responsible for verification of wastes prior to acceptance. A RCRA Part B permit application for operation of the facilities covered under this ADS has been prepared and submitted to the state. The facilities are currently operating under interim status.

Funds to operate and maintain sites 3 and 5 at the radioactive waste management site (RWMS) come from two sources: base support covered under this ADS and handling and disposal fees paid by generators of wastes shipped to this facility. Fee payments are used to support operations labor and equipment rental costs. Generators supply projections of waste volumes expected to be shipped to NTS, although actual volumes of waste received normally do not correspond to estimates. Problems have been encountered with relying on fee collections for continuing operations and maintenance. At the beginning of the fiscal year, generators operating under continuing resolution were not shipping wastes or submitting fee payments.

Budget estimates for this ADS were made to meet target levels as defined by HQDOE.

This and other WM ADS were prepared by contractor personnel and cover only contractor personnel costs (in other words, there are no identified project management and program direction costs). In the event the fees are not expended, the remaining funds are carried over into the next fiscal year. The base support funding amount is approximately 25 percent of the estimated contractor personnel costs.

The disposal of mixed waste is on hold pending approval by the State of Nevada for the RCRA Part B permit application and completion of the NEPA process. This may result in increased requirements and costs. The permit is being substantially revised by the state to include floodplain documentation, reduction in the number of disposal cells, and five-year limitation. DOE expects the revision to be completed in FY 1992.

ADS NV-308-AA -- Environmental Monitoring and Assessment. -- This ADS provides environmental monitoring of Area 3 and Area 5 radioactive and mixed waste management sites. These are areas in which low-level radioactive, and eventually, mixed wastes are disposed.

Table 4 shows a comparison of DOE and Corps cost estimates for ADS NV-308-AA. Wastes are expected to be received from 17 DOE generators including 14 off-site DOE facilities. This ADS also covers tritium studies at the Area 5 RWMS; low-level waste performance assessments for the RWMSs; performance assessment and environmental assessment for the Radioactive Thermoelectric Generators (RTGs); performance assessment for the Greater Confinement Disposal (GCD); site characterization studies in support of Performance Assessments; environmental analysis for a site-specific EIS; preparation of activity-specific EIS for GCD; and, performance assessments for new TSD units.

Table 3

NV-301-AA
Operations and Maintenance Support at the NTS
(dollars in thousands)

Overhead Category	DOE Cost (\$)	DOE (%)	Corps Cost (\$)	Corps (%)	Percent Difference
Project Management	0.0	0.0	84.0	2.6	-100.0
Program Direction	0.0	0.0	252.0	7.7	-100.0
Contractor Overhead	855.3	24.0	420.0	12.8	103.6
Subtotal	855.3	24.0	756.0	23.1	13.1
Direct Costs	2,100.0	58.9	2,100.0	64.2	0.0
Contingency	486.5	13.7	297.4	9.1	63.6
Escalation	121.2	3.4	118.0	3.6	2.7
Total	3,563.0	100.0	3,271.4	100.0	8.9

- Direct costs have been assumed to be the same.
- The difference between DOE and Corps estimates is expressed as a percent of the Corps estimate.

Environmental monitoring is an ongoing operation required by DOE Order 5820.2A and supports site characterization efforts. Performance assessments are also required by DOE orders and are both quantitative and subjective assessments of the manner in which the waste site, waste packages, and the waste constituents are projected to perform over the long-term. Simulation modelling risk-assessment methodology evaluates the site-specific characteristics of the disposal site and calculates the radiation dose that might be received by individuals living in the area.

This ADS was prepared by contractor personnel and covers only contractor personnel costs. From the documentation provided, the Review Team was able to identify only a fraction of the costs as direct, contractor overhead, etc. The Team included any amounts that could not be identified in other cost categories as contingency. The identified costs are for approximately two manyears of scientific or health physics personnel for environmental monitoring.

Table 4

NV-308-AA
Environmental Monitoring and Assessment at the NTS
(dollars in thousands)

Overhead Category	DOE Cost (\$)	DOE (%)	Corps Cost (\$)	Corps (%)	Percent Difference
Project Management	0.0	0.0	9.6	2.2	-100.0
Program Direction	0.0	0.0	24.1	5.5	-100.0
Contractor Overhead	123.9	8.2	96.4	22.2	28.5
Subtotal	123.9	8.2	130.1	29.9	-4.8
Direct Costs	241.0	15.9	241.0	55.4	0.0
Contingency	1,136.0	74.9	48.6	11.2	2,237.4
Escalation	15.0	1.0	15.2	3.5	-1.3
Total	1,515.9	100.0	434.9	100.0	248.6

- *Direct costs have been assumed to be the same.*
- *Contingency includes all amounts that could not be identified and attributed to other categories.*
- *The difference between DOE and Corps estimates is expressed as a percent of the Corps estimate.*

Performance assessments for low-level waste and mixed waste were scheduled for completion in FY 1991 and will only require updating. Environmental characterization for Areas 3 and 5 have been shifted to FY 1992. The validated target level does not provide for preliminary assessments on new TSD units. Further, the validated target level reduces support and possibly delays environmental studies supporting a site-specific EIS nearly one year. The scope of EISs will be established during the scoping process. A site-specific EIS will be tiered to the PEIS prepared by HQDOE.

On-going operations are covered under a 1977 EIS. An updated site-specific EIS is being prepared under ADS NV-303-AA. Environmental characterization is behind schedule pending HQDOE approval of categorical exclusions under NEPA. Categorical exclusions require Assistant Secretary-level approval for EM activities.

In addition to the three ADSs where cost comparisons were made, the review team analyzed two other ADSs. This review revealed a number of significant cost and schedule issues.

ADS NV-219-AA. -- Plutonium Contaminated Soil Clean-up at Area 13. This activity provides for the remediation of 993 acres of plutonium contaminated soils at Area 13 of NTS. Characterization of Area 13 is being performed under ADS NV-215-AA.

The unvalidated field estimate for ADS NV-219-AA programs funds for complete remediation of 20 percent of the 993 acres with an unknown technology. The remainder of the funds are spread over the five-year planning budget. The validated target level for ADS NV-219-AA programs zero dollars for this project based on the scenario that no remediation will be possible. No backup for cost estimates and no detailed scope of work were available.

There is an important relationship between ADSs NV-219-AA and other ADSs. ADSs NV-217-AA and NV-218-AA have similar problems because they are identical to ADS NV-219-AA except they apply to different areas of the NTS.

NV-215-AA is a four-year research effort to develop an appropriate technology for remediation of Plutonium contaminated soils at the sites contained in ADSs 217-219. This project includes: development of equipment; a feasibility study to evaluate costs, applicability, and effectiveness; and demonstration and testing of developed methodologies. This ADS is currently behind schedule. The new schedule calls for completion in the summer of 1992. The feasibility study is expected to have one of the following conclusions: required remediation of entire site, using developed technology; required remediation of selected hot spots; or no remediation is required because there is no cost effective technology available and/or there is no threat to life.

ADS NV-237-AA. -- Closure Plan Implementation at Nevada Test Site. -- Incidental wastes generated during testing operations were disposed at NTS sites. These disposal sites are now required to be closed under the requirements of RCRA. The sites are as follows:

- Site 1: Area 23 Landfill Waste Trenches
- Site 2: Area 6 Decontamination Pond
- Site 3: U3Fi Injection Well
- Site 4: Area 6 Steam Cleaning Effluent Pond
- Site 5: Area 2 Bitcutter Shop and Injection Wells
- Site 6: Area 23 Building 650 Leachfields
- Site 7: Area 27 Explosive Ordnance Disposal (EOD) Site
- Site 8: U3bu Crater

- In a separate analysis, a fourth subteam (two persons) reviewed the cost basis for 25 ADSs in detail with the responsible DOE/contractor project managers to determine if the estimate was reasonable.
-

Specific Findings

Remedy Selection. -- In prescreening of the Oak Ridge Field Office's ADSs, 98 were identified as having remedies associated with the FY 1993 budget request. "Remedy" in this instance was defined as any activity which physically did something with hazardous/radioactive waste. This broad definition allowed consideration of many WM activities such as waste storage, transport, and disposal. Of the 45 ADSs reviewed during the visit, 14 were found to have legally required remedies. Most were WM activities, but three of the ER activities had legally required remedies. Four of the remedies in the ADSs were found to be unreasonable in approach. Each of these is described below.

ADSs OR-244-CA and OR-244-WM provide funds to connect 100-150 sinks and drains in buildings at the Y-12 site to the sanitary sewer system for a total estimated cost of \$9.3 million. The sinks and drains are currently connected to the storm drain system. This is in violation of the National Pollution Discharge Elimination System (NPDES) permit. Much of the cost for this project comes from the requirement to excavate trenches outside the buildings in potentially contaminated areas and the construction of a mixed waste storage facility to accommodate the excavated material due to a lack of capacity elsewhere on the site. A reasonable alternative, inappropriately rejected by planners, was to collect the water from the sinks and drains and store it until it could be properly disposed. This pickup system is already used on the site for the disposal of contaminated liquids and wastes.

ADSs OR-415-CD and OR-415-GF provide funds for the removal of suspended ventilation ducts in buildings K-29, K-31, and K-33. The duct system was originally constructed using PCB-impregnated gaskets. Oil in the ducts leaks through the gaskets, carrying PCBs with it, and spills on the underlying conduits, piping, equipment, and the floor. The conduit and piping located near the ceiling interferes with the removal of the ducts. The buildings are currently unused, and D&D is contemplated in the future. It would appear to be more reasonable to lock the buildings and prevent access until the total D&D can be planned and executed.

For 25 ADSs, there are reasonable alternatives to the remedies selected for costing. However, the selected remedy was chosen on the basis of its ability to meet legal cleanup requirements and low(est) cost. Tables 1, 2 and 3 summarize the results of the review of the ADSs.

Cost Estimating and Accounting Practices. -- Three ADSs (OR-280, OR-332, and OR-378) were reviewed for cost and accounting practices. The results shown in Table 4 indicate that DOE costs may be 27 percent higher than for Corps projects. Most of this difference is for the overhead categories (\$9 million of the \$13 million total difference).

In a separate analysis shown in Table 5, cost estimates for 25 ADSs were reviewed and 17 were determined to be unreasonable. There were several indicators regarding the inadequacy of the DOE review of cost estimates and ADSs. Five ADSs (OR-209-G2, OR-243-G2, OR-280, OR-556-CD, and OR-556-EW) had no cost basis for all or a large part of the requested funds. Contractor personnel could not provide even minimal detail for the costs. DOE advised the review team that the numbers represented "placeholders in the budget" for the projects.

The estimates contained numerous errors. ADS OR-280 involved the construction of a number of RCRA caps which were historically estimated by the contractor to cost \$500 thousand/acre of cap. The cost estimate for the ADS requested \$3 million for the construction of only 0.7 acres of RCRA cap. ADS OR-250-CA includes funds for the installation of ozonators on plant cooling water towers ensuring discharges are not made to East Fork Poplar Creek. The ADS does not identify funds to install these units on all the towers (as planned) nor does it include money for continuing engineering and management support of the project. A sales tax of seven percent on material costs was applied to labor costs in the cost estimate for ADS OR-332. This same cost estimate used the on-site overhead rate of approximately 50 percent on direct hire construction costs instead of the correct off-site overhead rate of 8.2 percent. The project management costs include overhead twice by including it as an item within project management and then applying an overhead rate to the total. ADS 414 proposes the disposal of surplus materials and equipment without considering reuse of or salvage value.

Another finding is that there are excessive costs contained in some estimates. ADSs OR-331 and OR-331-EX provide for the remediation of the contents of all 39 inactive liquid low-level waste tanks at Oak Ridge National Laboratory (ORNL). (This includes field investigations and assessments, treatability studies, engineering, interim corrective measures of tank contents, final remediation of tank contents and treatment, storage, and disposal facilities to support remediation.) The estimate assumes three contingency levels; a contingency of 20 percent during the assessment phase; a contingency of 25 percent for the remediation of nine tanks; and a contingency of 40 percent for the remediation of 30 tanks. The unit cost estimate should have considered "economies of scale" and the "learning curve" (i.e., the gains in efficiency of design and construction that can be obtained when similar structures are built sequentially over a period of time).

ADS OR-332-AB and OR-332-EX provided for the construction of 21 RCRA caps (over 22 acres) along with some soil excavation and the construction of a "haul road" to the area. At a cost of \$6 million, this road (40 feet wide by 3,400 feet long) equates to about \$1,800 per lineal foot. This is five times the cost of a highway through a mountainous terrain. A survey of recent road job bids in August 1991 in the North Pacific region showed a cost per lineal foot that varied from a low of \$57 to a high of \$302 (for a road through difficult terrain). This cost estimate also applies the same Title I and II engineering cost rates for the RCRA caps (17 percent of construction cost) for all 21 caps (i.e., no economy of scale is considered). This rate, along with the construction management rate of 15 percent and salaried field support rate of 15 percent, is excessive.

**DOE Assumed Remedy Analysis Findings
Environmental Restoration**

ADS No.	Specific Remedy Assumed		Remedy Required by Laws		Other Reasonable Alternative(s)		Selected Alternative Reasonable	
	Y	N	Y	N	Y	N	Y	N
102-AA	Y		Y(1)			N	Y	
104-AA	Y			N		N	Y	
106-AA	Y			N	Y		Y	
108-AA	Y			N	Y		Y	
209-G2	Y			N	Y		Y	
243-G2	Y			N		N		N
280	Y			N	Y		Y	
331	Y			N	Y		Y	
331-EX	Y			N	Y		Y	
332-AB	Y			N	Y		Y	
332-EX	Y			N	Y		Y	
412-CD	Y		Y(2)			N	Y	
412-EW	Y		Y(2)			N	Y	
414-C2	Y			N		N	Y	
414-G1	Y			N		N	Y	
414-G2	Y			N		N	Y	
415-CD	Y			N	Y			N
415-GF	Y			N	Y			N
554-CD	Y			N	Y		Y	
554-EW	Y			N	Y		Y	
556-CD	Y			N	Y		Y	
556-EW	Y			N	Y		Y	
611-CD		N						
611-EW		N						
628-EW	Y			N		N	Y	

(1) ROD (2) Federal Facility Compliance Agreement

Table 2

**DOE Assumed Remedy Analysis Findings
Waste Management**

ADS No.	Specific Remedy Assumed		Remedy Required by Laws		Other Reasonable Alternative(s)		Selected Alternative Reasonable	
	Y	N	Y	N	Y	N	Y	N
223-AA	Y		Y			N	Y	
224	Y		Y			N	Y	
225	Y		Y			N	Y	
226	Y		Y			N	Y	
228-A	Y			N		N	Y	
232	Y		Y		Y		Y	
244-WM	Y			N	Y			N
342	Y		Y			N	Y	
343	Y		Y			N	Y	
347	Y		Y		Y		Y	
348	Y		Y		Y		Y	
356	Y		Y			N	Y	
419-EW	Y		Y			N	Y	
424	Y			N	Y		Y	
445	Y			N	Y		Y	
450	Y			N	Y		Y	

Table 3
DOE Assumed Remedy Analysis Findings
Corrective Activities

ADS No.	Specific Remedy Assumed		Remedy Required by Laws		Other Reasonable Alternative(s)		Selected Alternative Reasonable	
	Y	N	Y	N	Y	N	Y	N
244-CA	Y			N	Y			N
250-CA	Y			N(1)	Y		Y	
304	Y			N	Y		Y	
404	Y			N	Y		Y	

(1) Pending ROD

Table 4
DOE vs Corps Costs for Cost Elements
(dollars in thousands)

Category	DOE (\$)	DOE (%)	Corps (\$)	Corps (%)	Percent Difference (1)
Project Management	4,295	7.3	1,223	2.6	251.2
Program Direction	1,973	3.4	1,520	3.3	29.8
Contractor Overhead	9,054	15.4	3,639	7.9	148.8
Subtotal	15,322	26.1	6,382	13.8	140.1
Direct Cost(2)	30,584	52.0	30,584	66.2	--
Contingency	10,156	17.3	7,697	16.7	31.9
Escalation	2,728	4.6	1,517	3.3	79.8
Total	58,790	100.0	46,180	100.0	27.3

(1) Difference between DOE and Corps estimates as a percent of the Corps estimate.

(2) Direct costs have been assumed to be the same.

Table 5
Cost Estimate Review

Reasonable ADSs	Unreasonable ADSs	
OR-102-AA	OR-209-G2	OR-414-G2
OR-554-EW	OR-243-G2	OR-414-G1
OR-554-CD	OR-280	OR-414-C2
OR-228-A	OR-331	OR-415-CD
OR-244-WM	OR-331-EX	OR-415-GF
OR-342	OR-332-AB	OR-556-CD
OR-424	OR-332-EX	OR-556-EW
OR-450	OR-412-CD	OR-250-CA
	OR-412-EW	

This same failure to consider the costs of economies of scale and excessive rates is also found in ADSs OR-412-CD and OR-412-EW. A total of \$48 million for design and \$25 million for construction on an 11-acre soil cap project, two-acre soil excavation, and incineration appears excessive. The incineration costs are based on a rate which includes construction of a new incinerator. This rate, however, is not based on its use by any other facilities for incineration of wastes they may generate during remediation.

A number of items were found wrong with the accounting practices. The Cost Accounting Disclosure Statement has not been updated since 1987.

A number of practices result in the inequitable distribution of costs. For example, the plant overhead rate of approximately 50 percent is applied to capital items in the ER program and is not applied to capital items in the WM program.

Conversations with DOE and contractor managers indicated that activities are occasionally shifted to direct charges when overhead rates are becoming "too large." Accounting practices are changed to reduce the costs of these activities.

The construction and operations escalation factors have been incorrectly applied on ADS OR-332-AAB and OR-378.

ADS OR-332 included a prefinancing factor to provide 45 days of operating costs beyond the end of the fiscal year.

Due to changes in rates and factors, there is no method to systematically review estimates and track changes to the estimates in a timely and cost effective manner.

Recommendations

- Technically qualified environmental and cost engineering government employees should review and be responsible for the cost estimates used for budget submissions.
- Finance personnel should develop and ensure the usage of rates and factors in estimates.
- A formalized procedure should be developed and implemented to track changes to estimates to ensure accuracy.
- A standard method and format should be implemented for all estimates.
- A comprehensive review of the estimating systems and the accounting procedures for the development of rates and factors should be conducted to identify specific weaknesses and propose corrective actions.
- Government employees should review incurred costs.
- HQ DOE should develop consistent guidance for M&O contractors to use in applying overhead rates and factors.
- The cost accounting disclosure statement should be kept current.

Richland Field Office

Results in Brief

The review examined subactivity cost and backup data, descriptions of estimated work, and procedures used to develop cost estimates. Detailed cost estimates were requested for 35 ADSs. Table 1 summarizes the provided estimates. It was not possible to validate the cost estimates within the time available. The following is a summary of the review: cost estimates provided were thorough and adequate to perform review and analysis of the FY 1993 budget; the construction cost estimates were detailed in their preparation; escalation factors used for non-construction activities (management, operations, engineering, design, landlord, etc.) varied greatly, and were not consistent with the "Department of Energy Material and Labor Escalation Study" or OMB guidance; and no systematic application of contingencies was evident. This raised a concern about the rationale used in applying contingencies to the cost estimates supporting the FY 1993 budget request.

Process

The OMB/Corps team reviewed the legal requirements and cost backup data for the FY 1993 budget request. The detailed cost backup was requested for the ADSs shown in Table 1, together with a summary of DOE Richland's response to the requested cost estimates.

The team divided into five subteams. Four subteams reviewed waste management, environmental restoration, base services and support ADSs, and the fifth subteam reviewed cost estimates. The review process consisted of obtaining documentation for each ADS through interviews with representatives of DOE and the M&O contractor. The data for site restoration, waste management and landlord activities in the budget request for FY 1993 is contained in 204 ADSs, comprising the total unvalidated field budget request of \$1.518 billion.

The cost review focused on: general overview of backup cost estimates supporting the funds requested in the ADSs; the cost breakdown - the team analyzed project management, overhead, G&A, fees, and site-wide costs (base services and support); contingencies; and escalation.

Specific Findings

Cost Breakdown Analysis. -- The team analyzed direct costs, indirect costs, and site-wide costs including site-wide project management, program direction, base services and support.

For this analysis, indirect costs included project management cost, overhead, G&A, and fees. The percentages used for management, overhead, G&A, and fees were provided by HQDOE.

Table 1
Richland Site ADSs Reviewed for Cost
(dollars in millions)

ADS Number	ADS Title	Amount (\$)	Detailed Cost Provided	FY 1993 Breakout Provided
416	PUREX/UO3	57.9	yes	yes
430	General Program and Project Support	20.0	yes	yes
435	PFP Operations	91.3	yes	yes
1005	Continuity of Ops-Core Act	0.8	yes	(1)
3015	Nuclear Fuel Management	31.6	yes	yes
4000	HWVP	223.9	yes	yes
5175	Grout Disposal Program	27.5	yes	yes
7008	324 Bldg B Cell	9.6	yes	(1)
8000	Env. Monitoring-Surv (PNL)	10.6	yes	yes
9065	Env. Monitoring-RCRA Mon. Well	10.3	(2)	(2)
9098	Planning and Integration	14.6	yes	yes
9108	Tank Farm Storage Operations	61.6	yes	yes
9123	Waste Tank Hydrogen Stabilization	32.3	no	no
9129	Operations-Treatment	29.2	yes	yes
9150	Defense High-Level Waste Tech	24.0	yes	yes
9175	Grout Disposal Program	57.5	(3)	(2)
9208	WRAP 1	29.6	yes	yes
9218	WRAP 2	21.1	yes	(2)

Table 1 (continued)

Richland Site ADSs Reviewed for Cost
(dollars in millions)

ADS Number	ADS Title	Amount (\$)	Detailed Cost Provided	FY 1993 Breakout Provided
9645	222-S Lab Facility Complex	17.7	yes	yes
9900	HEC	47.3	yes	yes
1000	200 Area Steam System (Landlord)	18.9	yes	yes
1007	300 Area Electrical Upgrade	12.3	yes	no
1008	Road, Ground & Lighting Safety	6.6	no	no
1037	Core Outyear General Plant Project	5.7	yes	yes
3014	N Reactor Facility Shutdown	19.5	yes	(2)
5176	SST Waste Characterization	19.4	yes	yes
5178	SST ER-TD Integration	5.4	yes	yes
5179	SST ER Technical Support	7.3	no	no
9109	DST Treatment Operations	12.0	yes	yes
9137	Partitioning Facility-Tank Waste	15.9	(4)	(4)
9206	Contact Handled Retrieval Facility	6.1	(4)	(4)
9305	SST Treatment Ops (TPA) (W3B)	16.1	yes	yes
9803	Tank Farm Major Maint. Upgrade	8.6	(2)	no
9806	Line Item Hanford Project Upgrade	16.4	yes	yes
9810	Tank Farm Ventilation Upgrade	7.7	yes	yes

1. Difficult to follow
2. Summary information only
3. Backup doesn't match ADS
4. No estimate provided

Forty-eight ADSs totaling \$228.9 million were categorized as site-wide costs, which comprised 15.1 percent of the total unvalidated field estimate of \$1,518 billion. The remaining 84.9 percent was categorized as either direct cost or indirect cost. Seven ADSs representing \$233.4 million of the non-site-wide costs were analyzed to determine which part of the 84.9 percent was direct and indirect cost. The analysis shows direct labor and material costs are 55.4 percent of the total, indirect costs are 29.5 percent, and site-wide costs are 15.1 percent. This analysis was based on a small sampling of ADSs. In subsequent analysis prepared for OMB, the unvalidated field estimate was refined and updated to reflect the FY 1993 funding level of \$1.328 billion. There were no substantive differences in the proportions of costs attributed to the site-wide, direct and indirect components.

Escalation. — Escalation rates developed for Richland are defined in the manual "Department of Energy Material and Labor Escalation Study." The rates in the January 1990 study showed a composite rate of 4.95 percent for FY 1993, which could be applied to construction and non-construction costs. The February 1991 study contains a composite table for Construction Labor and Materials and a separate table for Engineering Labor. The February 1991 study construction rate for FY 1993 is 3.2 percent and the engineering labor rate for FY 1993 is 5.5 percent.

The escalation rate for 20 randomly-selected ADS questionnaires ranged from zero percent to 8.3 percent, or an average of 2.9 percent. The backup documentation for most other ADS cost estimates indicated escalation rates of zero percent to approximately eight percent. The Civil Works Index (OMB Index) used by the Corps for escalating the FY 1993 budget request is 6.3 percent for adjusting government employees labor costs, and four percent for all other costs. The Corps' escalation rates and the rates recommended by the DOE escalation study are reasonably close.

Where DOE applied its escalation rates to construction estimates, we found such rates were reasonable. Escalation was shown by separate line items for different features of the work, and was computed from the date of preparation of the cost estimate to the midpoint of construction for each feature. An escalation table was attached to each estimate.

The application of escalation rates for non-construction activities was not consistent. For many cases only dollar amounts were listed on the ADS, without any documentation on the backup cost estimates.

Contingencies. — The construction estimates prepared by Kaiser Engineers Hanford (KEH) applied a percent contingency to each line item of the estimate. A detailed explanation was provided for each contingency used. Contingency for a typical construction cost estimate ranged between 10 and 30 percent.

For non-construction ADSs, contingencies were usually not mentioned. However, supporting documents for some ADSs stated that contingencies were zero percent.

In a few other cases relatively small lump-sum amounts (usually from less than one to three percent) were shown.

The same 20 ADSs selected for the escalation review were reviewed for contingency application. Only one ADS included contingency in the estimate. A review of cost backup for another seven ADSs showed that only one ADS included contingency in the cost estimate. The application of contingency in the backup cost estimates and on the questionnaires is inconsistent. While the construction cost estimates prepared by KEH provided a good analysis of contingency, non-construction estimates for the most part did not include contingencies.

Interagency Review Panel. — The results of the OMB/Corps analysis of the Richland site FY 1993 budget request was briefed to the interagency review panel on December 5, 1991. The briefing focused on the legal drivers requiring efforts associated with environmental remediation at the site, and findings associated with cost issues. The cost analysis and findings were based on the cost backup data provided by the site. Detailed cost backup was provided on 35 ADSs representing 66 percent of the unvalidated FY 1993 budget request. Based on the data provided, we conducted cost comparisons on four estimates. The findings are as follows:

Finding No. 1: KEH Construction Cost Estimating Method for Labor - Crew Costs

- The labor rates paid at the Richland site are in line with Davis-Bacon rates for construction crafts. The total labor cost estimate for a construction project may be inflated due to the method used by KEH in applying labor rates. KEH uses the primary craft manhour rate in the crew, rather than the actual manhour rates for each craft in the crew. That is, if a crew consists of two journeymen pipefitters and an apprentice, the labor rate of a journeyman pipefitter is used for all crew members. The following illustrative example compares the actual labor rates to the method used by KEH.

Craft Difference	Actual Rates	Assumed by Kaiser	Difference
Crew 1			
Two Journeymen Pipefitters	2 x \$30.81	2 x \$30.81	
One Apprentice Pipefitter	21.57	30.81	\$9.24
Crew 2			
Cement Mason	23.81	23.81	
Laborer	20.81	23.81	3.00
Total	\$127.81	\$140.05	\$12.24

- For the above example, the labor cost would be overstated by 9.6 percent. If the total labor cost is one-third of the total estimated cost (TEC), the TEC would be overstated 3.2 percent. Depending on the crew composition, the estimating method used by KEH may have little impact on the TEC or may be greater than the 3.2 percent illustrated.

**Finding No. 2: ADS 9065, RCRA Groundwater
Monitoring Well Installation
Cost Comparison**

- The ADS FY 1993 budget request is for \$10.25 million and includes the installation of 47 non-hazardous/non-radiological monitoring wells, and 13 hazardous/radiological monitoring wells.
- The following is a comparison of the cost of the Corps to DOE for drilling a 250 foot well at a hazardous waste site versus the cost in the ADS cost backup.

Non-Hazardous/Non-Radiological Monitoring Well Cost		
	Cost Per Well	Cost for 47 Wells
Richland	\$125,600	\$5,903,200
Corps	\$76,400	\$3,590,800
Difference	\$49,200	\$2,312,400

- The majority of the cost difference is attributed to the length of time required to mobilize and construct each well, plus an overestimation of the labor cost for the geologist by \$14,000 per well. For 47 wells, the cost of the geologist is overestimated by \$658,000. The Corps estimate is based on 20 days to construct each well and the Richland estimate assumes 30 days per well.
-

Finding No. 3: Solid Waste Disposal Cost Comparison

- The Corps has a disposal contract with Envirocare of Utah for naturally occurring radioactive material (NORM) waste disposal.
- Although, the material types are not the same as the Hanford waste materials, a detailed cost analysis may uncover reasons for the cost differences, and ways to reduce the Hanford solid waste disposal cost.
- The following comparison of FY 1993 costs indicates a large difference.

Envirocare of Utah	Richland
NORM Waste = \$23/CF	Low Level Waste = \$91/CF
NORM Mixed Waste = \$102/CF	Low Level Mixed Waste = \$297/CF

Recommendations:

- The DOE field office at Richland does not have adequate personnel available to prepare estimates or to review cost estimates prepared by the M&O contractor. The DOE site staff should include cost engineers and budget analysts.
- DOE should take steps to increase federal control of technical reviews and contracting activities. The present system does not provide adequate technical and fiscal control of the site activities.
- A tracking system is needed that will track costs and progress toward milestones at the ADS and subactivity level. In addition, standard procedures need to be developed for preparation of budgetary estimates for design cost, management cost, operations costs, maintenance costs and other non-construction costs. Procedures should also include instructions on the application of escalation and contingency.

Rocky Flats Plant

Results in Brief

There was evidence that the methods used to prepare ADS cost estimates tended to overstate direct costs. Contributing factors were: the application of high indirect rates to both M&O contractor direct labor and to non-labor purchased dollars; lack of updated construction cost estimating procedures; existence of policies that limit competition for sub-contracted services and the practice of utilizing program-wide ADSs that contain activities that are in both project ADSs and indirect cost pools.

Other factors were noted as creating discrepancies between current funding requests and latest working estimates. The most significant elements were: project scope increases caused by state and federal regulatory authorities review of comments; project schedule slippage delaying required expenditures to a later fiscal year; and, the lack of policy, procedure and personnel to review cost estimates and schedules.

Process

Five ERWM ADSs, including three WM and two ER ADSs, out of the 84 total were reviewed in detail at the Rocky Flats Operations Office, Boulder, Colorado. These five ADSs constitute \$44.6 million or 16 percent of the \$279 million ERWM Program (FY 1993 unvalidated field level dollars). The selected activities included four project ADSs and one program-wide ADS and represent a cross section of the total site program.

A new Management Control System (MCS) had been recently implemented and was used for FY 1992 estimates. At the time of the site visits, the MCS had not been applied to the FY 1993 estimate. As a result, the review of project ADSs focused on FY 1992 data. An analysis was made for one project ADS to determine the difference in overhead costs between a DOE and a Corps equivalent project.

One specific difference between Corps and DOE costing procedures is the Corps does not include base services as a cost in its environmental clean up activities. DOE and its M&O contractor personnel are tenants at the field site while the Corps usually operates from its home office. The DOE base service costs were included as part of the contractors overhead costs. The Corps could not separate that portion of the overhead that is for base services.

An adjustment was made to reflect the differences in charges for support services since portions of DOE support costs are considered direct costs by the Corps rather than applied as

overhead costs. The support costs were separated into overhead and direct costs and added to the contractor's overhead and direct costs.

A proportionate amount of the WM program support ADSs cost was distributed to both the direct and overhead costs of the project ADS.

Table 1

ADS #RF-3153
New Sanitary Landfill
Rocky Flats Plant, Colorado
(dollars in thousands)

Overhead Category	DOE Cost (\$)	DOE (%)	Corps Cost (\$)	Corps (%)	Percent Difference
Project Management	18.4	0.3	15.6	0.3	17.9
Program Direction	17.6	0.3	511.1	8.8	-96.6
Contractor Overhead	1807.5	27.3	777.8	13.3	132.4
Subtotal	1843.5	27.9	1304.5	22.4	41.3
Direct Costs	3889.2	58.8	3889.2	66.7	0.0
Contingency	769.9	11.6	423.5	7.3	81.8
Escalation	114.1	1.7	212.9	3.7	-46.4
Total	6616.7	100.0	5830.1	100	13.5

• The difference between DOE and Corps estimates is expressed as a percent of the Corps estimate.

Specific Findings

Comparison of Costs for ADS RF-3153 -- The cost estimate for the construction of the new sanitary landfill was 13.5 percent higher using the DOE estimates. Because of the difficulty in accurately measuring the categories of costs in the ADSs, the "observed" differences in the individual cost components listed on Table 1 show a high degree of variability.

The estimate contained almost \$1 million in unsubstantiated costs for material and labor. Pricing for all significant items of material or equipment should be substantiated by some form of quotation and should include costs for freight, handling, storage and any applicable taxes. Labor costs should be estimated by craft hours at the applicable rate or by a sub-contractor's quotation.

The final mark-up applied to all fixed-price contracts is the prime contractor's Overhead Profit and Bond (OP&B). The landfill estimate per the Rocky Flats Plant Estimating Guide (RFPEG), stipulated that a flat rate of 25.3 percent be used. The practice of using a flat percentage rate will generally lead to distorted and/or inaccurate estimates. The preferred method of estimating a contractor's mark-up is to itemize all overhead costs and to calculate a reasonable profit and bond based upon the circumstances of each contract.

The final factor applied to the estimate is contingency. In accordance with RFPEG, the acceptable range of contingency for a Concept Design is 15-25 percent. The Corps would use as low as five percent for uncomplicated, low-risk construction projects, such as a sanitary landfill.

The new sanitary landfill project has a FY 1993 funding request of \$4 million. However, based on a flow chart schedule of activities provided by DOE during the site visit, DOE indicated that funding of only \$100,000 is needed in FY 1993.

Cost Estimating Procedures. -- The estimating procedures in use tend to overstate costs. There is an inadequate number of craft rates in the data base. This restricts the estimators crew selection to only those crafts entered in the system. The labor-rate calculations for the crafts in the new sanitary landfill estimate were provided by site personnel for Corps review. A flat rate of 28.85 percent for payroll taxes and insurance was used. Corps experience is that this percent will vary with the particular craft, due to significant variations in workman's compensation insurance rates. It may be prudent to make calculations for individual labor crafts, rather than use an average rate. Historically, mechanical and electrical crafts have lower workman's compensation insurance rates which translate into lower total burdened labor rates.

Ten percent of each craft's base labor rate was added as "supervision" costs. The Corps is not familiar with this practice. Supervision that is part of direct labor cost is generally attributable to working foremen. Any non-productive supervision should be part of indirect costs. The labor agreements furnished for the review indicated that apprentice labor is permitted on RFP projects. For this reason, use of the journeyman rate would be sufficient. The addition of supervision into the wage rate calculation does not appear to be justified.

Each category of direct construction cost had been multiplied by one or more general mark-up factors. The factors used in the estimate for a new sanitary landfill were miscellaneous labor and material (10 percent) and building factor (15 percent). Corps practice is to provide for the contractor's expendable tools by adding a dollar amount equal to three percent of direct labor costs. Anything above that amount should be substantiated. A building factor of 15 percent of

the direct labor dollars on top of the 10 percent miscellaneous factor is considered to be unjustified for a construction contract executed outside of sensitive or "Hot" areas of the plant that require no special access control. The use of "Building Factors" may be appropriate for other projects. There appears to be too many discretionary factors that when used in succession would compound the costs.

Program Support ADSs. — The program support ADSs represent a substantial portion of the total ERWM FY 1993 program (15 percent for ER projects and 32 percent for WM projects, respectively). The significance is that various cost activities are being budgeted in more than one place. The cost items of project management, health and safety, quality assurance, training, permitting, technical support and compliance are included in both project and program-wide ADSs. These items are included in project ADS as direct and indirect costs. This practice could result in over-estimation of total costs.

M&O Contractor Indirect Rates. — The M&O contractor applies an average of 277 percent indirect mark-up to the base labor rate per hour. The comparable Corps average is 130 percent. The M&O contractor applies 13.5 percent mark-up to each non-labor purchased dollar amount. During the EG&G explanation of the newly installed Management Control System, this element of indirect cost was not explained. This amount probably represents the M&O contractor's home office expense. The Corps normally applies rates of between three and 10 percent.

There are several anomalies associated with the M&O contractor's method of determining indirect rates: fringe benefit costs, i.e., health insurance, unemployment insurance and retirement were applied to overtime; cost items, i.e., health and safety, quality assurance and training are also direct-charged to ADSs. This creates a potential for duplication of costs. No backup material was available to substantiate the various indirect rates being used for FY 1992 and for the FY 1993 estimates.

Cost Accounting Standards. — The M&O contractor was audited in the year prior to the Corps/OMB site visit. That audit showed that the contractor was not in compliance with the Cost Accounting Standard (CAS). Specific details of audit deficiencies were not discussed. The contractor has made and is making accounting system changes to be in compliance.

Limited or Insufficient Competition. — The DOE procurement policy at RFP restricts bidding to small and/or disadvantaged businesses for contracts expected to be below \$3 million. This policy appears to limit competition. Corps experience with restricted procurement indicates that it increases the cost of contracts.

Many Federal agencies award contracts through the use of the Base Order Agreement (BOA). BOAs are agreements with construction contractors who pre-qualify to do certain types of work and have competed for "open end" contracts that have a maximum contract dollar amount. Contracts are usually of one-year duration with options to extend one or two additional years. Individual Delivery Orders can then be issued to the BOA or competed between qualifying contractors. BOAs are used to get contractors working quickly on projects as the

need arises rather than going through the whole procurement process on each delivery order. Some of the BOA participants are single companies while others are groups (prime contractor with designated sub-contractors). The use of a BOA may save time and in-house contracting dollars, and in some cases, may result in increased costs by limiting competition for construction work. Issuing delivery orders requiring only the use of a BOAs sub-contractor could conceivably increase construction costs as the prime contractor is enlarging overhead and profit while performing little work.

Project Cost Increases and Funding Requests. -- For ADS 1001B Operation of Unit 1, 881 Hillside Remediation, it was found that all major sub-contracts have been awarded. The cost breakdown of the work package as compared to the actual amount of the various contract awards indicated that approximately 37 percent construction contingency remained in the ADS. A 10 percent contingency would generally be considered sufficient.

Although one of the sub-contracts was only eight weeks old, 15 change orders had already been issued. This increased the amount of the contract by 23 percent. This is considered to be unusually high.

The cost of all purchased services (sub-contracts) has been increased by 13.5 percent to yield the total burdened activity costs. This amount is the current (FY 1992) indirect mark-up for non-EG&G labor. Corps experience is that this practice further distorts total costs.

The two ER program ADSs reviewed indicated that the FY 1992 Five-Year-Plan for 881 Hillside Assessment and Remediation projects increased in cost from \$4.7 million to \$7.9 million. This was a direct result of state and federal authority review and comments on the original scope of work. These projects are considered to be the highest priority ER projects at Rocky Flats Plant and will require funding from other lower priority ER projects to keep this project on schedule.

DOE Personnel. -- DOE-RFP manpower levels are low and consist primarily of managers. The on-site office does not have a staff of in-house personnel with cost engineering experience. The DOE relies heavily on the M&O contractor and/or outside service contracts for cost estimating expertise.

Recommendations

- An independent audit of the M&O contractor's costs should be conducted to determine the accuracy of direct and indirect labor rates in use at RFP.
- DOE should update applicable cost estimating manual(s) to incorporate more modern and comprehensive estimating practices.

- DOE should review the policy of utilizing BOAs and make a stronger effort to increase the use of open competitive bidding for construction work.
- DOE should evaluate its current bidding policies with the goal of increasing open competition.
- A comprehensive job-costing system should be implemented and maintained to manage and control projects.
- The activities associated with overall program support should be included with appropriate project ADSs.
- DOE should establish and staff an in-house cost engineering/cost accounting capability.

San Francisco Field Office

Results in Brief

The cost of ERWM projects is higher than similar Corps work. This is the result of higher direct and indirect costs. The direct costs are generally higher because of higher salaries paid by the M&O contractor as compared to federal employee salaries. The contractor's escalation rates for projects vary from 4.1 to 6.6 percent for FY 1993 as compared to the escalation rate of 4.1 percent specified by OMB for Corps work. The indirect costs of a project are generally higher than those experienced by the Corps. This is primarily due to the M&O contractors indirect mark-up of direct labor which varies from 220 to 270 percent of the base labor rate. This compares with a 130 percent average rate generally applied within the Corps. There are no comparable program support ADSs in the ER or Corrective Action (CA) programs. Table 1 shows a comparison of DOE and Corps costs for the two ADSs reviewed in detail.

Process

The Lawrence Livermore National Laboratory (LLNL) was visited because the bulk of the San Francisco Operations Office program is there. Nine ADSs were reviewed in detail out of the 104 ADSs under the control of the San Francisco Operations Office. At the PPL, the total cost of nine ADSs is \$71.5 million or 57 percent of the total ERWM Program of \$126.1 million.

These nine ADSs represent a cross section of the total program with three ER, four WM and two CA ADSs.

For the ER and WM ADSs, the detailed backup did not match any of the funding levels identified at the unvalidated field level estimate, validated target level or the PPL. All four funding levels for the CA ADSs on the other hand, were identical. Table 2 shows the ADSs reviewed and the associated funding levels.

Two ADSs were reviewed in detail to compare the costs for DOE projects to the costs for similar Corps projects. A review of the remaining ADSs funded in FY 1993 was made to determine if program support or overhead type ADSs were included at this site. Program support ADSs are defined as ADSs which fund certain contractor organizations or functions that support the entire program and are considered to include overhead items. These ADSs tend to be labor intensive. The program support ADSs at LLNL include items such as quality assurance, health and safety, writing procedures, permit applications and reports, planning, and training.

Table 1

DOE/Corps Cost Comparison
Summary of San Francisco ADSs
SAN-1006 and SAN-1405,
(dollars in thousands)

Overhead Category	DOE Cost (\$)	DOE (%)	Corps Cost (\$)	Corps (%)	Percent Difference
Project Management	1,102.4	4.7	517.7	2.3	112.9
Program Direction	1,623.7	6.9	1,135.2	5.1	43.0
Contractor Overhead	3,096.2	13.2	3,585.3	16.0	-13.6
Subtotal	5,822.3	24.8	5,238.2	23.4	11.2
Direct Costs	12,943.7	55.1	12,943.7	57.9	0.0
Contingency	2,546.1	10.8	2,249.1	10.1	13.2
Escalation	2,161.9	9.2	1,932.9	8.6	11.8
Total	23,474.0	100.0	22,363.9	100.0	5.0

• The difference between DOE and Corps estimates is expressed as a percent of the Corps estimate.

Table 2

San Francisco ADSs
Cost Estimates Reviewed in Detail
(dollars in thousands)

ADS # and Program Type	Activity	Preliminary Unvalidated Level	Validated Target Level	Program Planning Level	Detailed Estimate Level
SAN-1005 (CA)	Tank Upgrades Project	10,200	10,200	10,200	10,200
SAN-1006 (CA)	LLNL Sewer Pipe Rehabil.	5,500	5,500	5,500	5,500
SAN-1209 (ER)	LLNL Ground Water Proj-Cleanup	4,070	3,970	4,070	3,241
SAN-1210 (ER)	LLNL Ground Water Proj-Main Street	7,120	5,460	7,120	5,771
SAN-1211 (ER)	LLNL Ground Water Proj-Cleanup O&M	4,900	4,400	4,900	2,278
SAN-1402 (WM)	Cont. of Oper.	7,905	6,057	10,658	7,900
SAN-1403 (WM)	Treatment	7,067	3,388	3,388	3,034
SAN-1404 (WM)	Storage	9,850	7,587	9,850	6,766
SAN-1405 (WM)	Disposal	15,800	12,220	15,800	7,687
	Totals	72,412	58,782	71,486	52,377

• CA = Corrective Action; ER = Environmental Restoration; and WM = Waste Management.

One specific difference between Corps and DOE costing procedures is that the Corps does not include base services as a cost in its environmental cleanup activities. DOE and its M&O contractor ERWM staff are tenants at the field site, while the Corps usually operates from its home office. To make a fair comparison, the DOE base service costs were subtracted from their direct costs and the Corps direct costs were assumed to be the same as DOE direct costs including base services.

Table 3

ADS #SAN-1006
Sewer Pipe Rehabilitation - Corrective Action
Lawrence Livermore National Laboratory
(dollars in thousands)

Overhead Category	DOE Cost (\$)	DOE (%)	Corps Cost (\$)	Corps (%)	Percent Difference
Project Management	520.0	3.7	318.4	2.4	63.3
Program Direction	450.0	3.2	636.9	4.8	-29.3
Contractor Overhead	1,476.8	10.5	1,592.2	12.1	-7.2
Subtotal	2,446.8	17.4	2,547.5	19.3	-4.0
Direct Costs	7,961.0	56.6	7,961.0	60.4	0.0
Contingency	1,850.0	13.1	1,050.9	8.0	76.0
Escalation	1,819.0	12.9	1,618.3	12.3	12.4
Total	14,076.8	100.0	13,177.7	100.0	6.8

• The difference between DOE and Corps estimates is expressed as a percent of the Corps estimate.

An adjustment was made to reflect the differences in charges for support services since portions of DOE support costs are normally considered direct costs by the Corps rather than applied as overhead costs. The support costs were separated into overhead and direct costs and added to the contractor's overhead and direct costs.

Table 4

ADS #SAN-1405
Disposal - Waste Management
Lawrence Livermore National Laboratory
(dollars in thousands)

Overhead Category	DOE Cost (\$)	DOE %	Corps Cost (\$)	Corps (%)	Percent Difference
Project Management	582.4	6.2	199.3	2.2	192.2
Program Direction	1,173.7	12.5	498.3	5.4	135.5
Contractor Overhead	1,619.4	17.2	1,993.1	21.7	-18.7
Subtotal	3,375.5	35.9	2,690.7	29.3	25.5
Direct Costs	4,982.7	53.0	4,982.7	54.2	0.0
Contingency	696.1	7.4	1,198.2	13.0	-41.9
Escalation	342.9	3.6	314.6	3.4	9.0
Total	9,379.2	100.0	9,186.2	100.0	2.3

• The difference between DOE and Corps estimates is expressed as a percent of the Corps estimate.

Specific Findings

Comparison of Costs for Two Selected Projects. -- The DOE contractors total cost for the CA project (Table 3) is 6.8 percent higher than the Corps. For the WM Project (Table 4), the computations show the contractors overhead is 25.5 percent higher than the Corps and the overall DOE project cost is 2.3 percent higher than the Corps. Although these are relatively small differences, DOE's costs are generally higher than comparable costs incurred by the Corps.

Overhead Mark-up of Direct Labor Rates. -- The M&O contractor applies overhead mark-ups on his direct labor that vary from about 220 to 270 percent of the base labor rate per hour compared to the Corps average of 130 percent. The contractor's rate varied depending on which of his organizations was performing the work.

Program Support ADSs. -- In the Waste Management program, some ADSs were set up primarily to pay for certain contractor organizations and activities in support of the entire program. These costs are in addition to any direct or indirect charges to projects/activities in the other project ADSs. As a result, the programwide costs had to be distributed to project ADSs. The results presented in Table 4 for example, reflect this adjustment to the project ADS. Programwide ADSs represent, in effect, an undistributed overhead cost to the projects. In order to obtain a true project cost, the dollar value of these program ADSs divided by the total dollar value of all the project ADSs resulting in a markup percentage to be added to each project ADS. The results are shown in Table 5 for Waste Management Projects. The ER and CA programs do not appear to have program support ADSs (no adjustment was necessary for the ADS in Table 3).

The program support ADSs for WM primarily pay for services of the systems group in the Hazardous Waste Management Division and sub-contract help for that group. This includes administration, health and safety, processing requisitions, waste and sample tracking, quality assurance, procedure writing, permitting, reporting and training. About 75 percent of these ADSs are for labor.

There is the potential for overstating the budget request for items such as health and safety since these items are included in project ADSs as direct and overhead costs and in the Program Support ADSs.

Procurement Practices. -- The M&O contractor, an entity of the University of California (UC), is not required by their contract to follow the Federal Acquisition Regulations. This limits competition and potentially increases the cost of obtaining goods and services, including construction and remedial action.

The M&O contractor normally uses bidders lists developed from previous contracting experience in lieu of full and open competition for most procurement actions. On occasion, the M&O contractor uses the Commerce Business Daily (CBD) to open their procurement to the maximum number of interested bidders. Conversely, the Corps and other federal agencies are required to routinely use the CBD for procurement of goods and services.

The M&O contractor has, over the last five years, moved from using sole source procurement to more open competition, presumably, decreasing the direct cost of procured goods and services.

Escalation. -- Escalation factors vary from those specified by OMB for Corps use. For FY 1993, the escalation factors varied from 4.1 to 6.6 percent depending on the type of project or work. Generally, 4.1 percent was used for in-house labor; however, some ADSs used higher rates. For procured goods and services, escalation rates as high as 6.6 percent were found in the ADSs. The differences in the rates were attributed to judgments made by the M&O contractor.

DOE Personnel. -- The on-site DOE office does not have a staff of in-house personnel trained in cost estimating. DOE-San Francisco manpower devoted to contractor oversight appears to be low compared to the Corps for managing similar type projects and consist primarily of managers with limited time to review projects. To compensate for low in-house manpower levels, many projects are reviewed for both cost and scope by technical service contractors under contract to DOE (independent third party review).

Table 5

List of Waste Management Program Support ADSs
(dollars in thousands)

SAN 1402	Continuity of Operations	\$6,057
SAN 1406	Waste Minimization Planning	<u>\$1,639</u>
	Total LLNL Program Support ADSs	\$7,696
	Total LLNL Waste Management ADSs	\$31,091
Program Support WM ADSs/Project WM ADSs		
$\$7,696 (\$31,091 - \$7,696) = 33\%$		

- All dollar values represent the FY 1993 preliminary validated target level in the Five-Year Plan.
- This computation was also done at the PPL funding level and the mark-up factor was also 33 percent.

Recommendations

- An independent audit of the M&O contractor costs should be conducted to verify the overhead mark-up on direct labor.
- Program Support ADSs should be eliminated and all program-related costs be equitably applied to projects either as a direct or an overhead charge.
- The M&O contractor should follow the Federal Acquisition regulations to assure full and open competition to reduce costs for procured goods and services. This should be a requirement of the contract when it comes up for renewal in October 1992.
- Specific policy and procedural guidance should be distributed on escalation rates to assure that only approved rates and computation procedures are used.

- DOE operations offices should be adequately staffed with federal personnel having technical and cost engineering expertise.

Savannah River Field Office

Results in Brief

The review found no historical record for project costs and no standardized cost estimating system to prepare budget estimates. Westinghouse has been acting as the M&O contractor since 1989, and is in the process of implementing a new budget and accounting system -- Integrated Budget, Accounting and Reporting System (IBARS) -- to track actual project costs and expenditures.

The cost backup data for most ADSs at the Savannah River Site (SRS) lacked sufficient detail to support the cost estimates shown in the ADSs. Where backup data was available, it applied only to the unvalidated field estimate. There was no standard method for estimating overhead costs for labor and overhead costs were applied differently to the ER and WM ADSs. Escalation rates were also inconsistently applied and ranged from zero - five percent per year.

Many ADSs regarding remedial action contain funding for parallel efforts such as the development of alternative technology and cleanup standards and conventional design and construction. While this dual programming approach may result in higher costs, it offers the opportunity to compare these costs and may ultimately show substantial savings.

For most environmental restoration activities reviewed, the budget estimates are based on excessively conservative assumptions regarding the technical scope of proposed projects.

The review also found that a significant backlog of technical documents scheduled for review by state and federal regulatory agencies has delayed by 200-days certain planned environmental activities at the site. Such delays normally increase project costs.

Using the procedures described below, Table 1 shows that total DOE costs attributed to the projects studied were higher than comparable Corps costs by 46 percent or \$157.1 million. The differences are primarily due to: higher contractor overhead costs for design and construction; higher costs for project management and program direction/contractor oversight; and the use of many subcontractors. Due to the lack of backup information on costs, this estimate is based on backup data provided at the site rather than on the PPL budget levels.

Process

The OMB/Corps team divided into three subteams, under the direction of OMB, to address questions regarding legal requirements and the selection of remedies. The Corps also divided into two subteams to answer questions regarding costs.

The ADSs comprise two major programs: ER and WM. Funding for each group is shown in Table 2.

The team selected and reviewed cost data in detail for 41 of the 139 ADSs that totaled \$410 million or 63 percent of PPL. These included 29 project ADSs (10 ER and 19 WM) and 12 program-wide ADSs (5 ER and 7 WM) as shown in Tables 3 and 4. These ADSs represent all types of proposed projects and the largest amount of estimated funding. Because of insufficient cost data to support the ADSs for the Defense Waste Processing Facility (DWPF) Vittrification Preop/Operations (SR-631-AB, \$2.6 million) and Savannah River Laboratory DWPF (SR-44-AA, \$19.5 million), the review did not analyze ADSs for the Savannah River Laboratory.

Table 1

**DOE/Corps Cost Comparison
Summary of Savannah River ADSs**
(dollars in thousands)

Overhead Category	DOE Cost (\$)	DOE (%)	Corps Cost (\$)	Corps (%)	Percent Difference
Project Management	26,332	5.3	7,636	2.3	244.8
Program Direction	92,586	18.7	21,856	6.4	323.6
Contractor Overhead	138,713	28.0	77,936	23.0	78.0
Subtotal	257,631	52.0	107,428	31.7	139.8
Direct Costs	190,905	38.5	190,905	56.4	0
Contingency	27,525	5.6	28,179	8.3	-2.3
Escalation	19,770	4.0	12,233	3.6	61.6
Total	495,831	100.1	338,745	100.0	46.4

- This represents all five composite projects at Savannah River; ER Assessments and Cleanups, WM Construction and Operations and the Defense Waste Processing Facility (DWPF).
- This difference between DOE and Corps estimates is expressed as a percent of the Corps estimate.

The review found that cost backup data generally supported the unvalidated field estimate funding level, although not in all cases. To compare DOE and Corps costs, similar types of ADSs were aggregated into five groups and the costs were added to create a composite project of that type. These groups were:

- **ER assessments.** -- projects which include preparation of Work or Closure Plans, field investigations and laboratory analyses, preparation of RI/FS reports and performance of Risk Assessments;
- **ER cleanups.** -- projects which include the design and construction of a selected remedy;
- **WM operations.** -- projects which include the day-to-day operation of treatment plants or facilities;
- **WM construction.** -- projects which include construction of large facilities related to the waste management activities;
- **DWPF.** -- projects related to the startup and feed processes into the DWPF.

Table 2

**Savannah River Site
Distribution of FY 1993 Budget by Program
(dollars in thousands)**

Program	FY 1993 Funding Level (\$)		
	DOE Request	PPL	Unvalidated Field Est.
Environmental Restoration	41,860	73,000	76,647
Waste Management	503,546	577,053	722,362
Total	545,406	650,053	799,009

Table 3

Environmental Restoration ADSs Reviewed for Cost
(dollars in thousands)

ADS Number	ADS Name	PPL Funding Level
	<u>Environmental Restoration Assessments</u>	
306-AA	RCRA/CERCLA Basin Investigations	3,759.0
314-A	Underground Storage Tanks Assessment	400.0
	<u>Environmental Restoration Cleanups</u>	
245-C	Sanitary Landfill Closure	2,650.0
247-C	LLRWDF Closure	2,318.0
302-C	A/M-Area Groundwater Remediation	5,344.0
309-C	SRL Seepage Basins Closure	2,265.0
314-C	Underground Storage Tanks	1,800.0
342-C	RCRA/CERCLA Remediations	7,000.0
469-C	TNX Groundwater Remediation	2,620.0
470-C	F/H-Area Groundwater Remediation	5,421.0
	<u>ER Program-wide ADSs</u>	
307-A	PB&C and Technical Support	4,840.0
339-A	Data Base Management	400.0
478-A	ER State Reimbursement for FFA	1,500.0
479-A	DOE ER Program Management Support	4,700.0
481-A	DOE Savannah River Program Direction	0
Total		45,017.0

Table 4

Waste Management ADSs Reviewed for Cost
(dollars in thousands)

ADS Number	ADS Name	PPL Funding Level
<u>Waste Management Operations</u>		
1-AB	WM High Level Waste Storage - H Area	26,578
1-AI	WM High Level Waste Storage - F Area	15,031
2-AA	WM Evaporation - H Area	12,262
2-AL	WM Evaporation - F Area	6,334
3-AA	WM Waste Transfer Program - H Area	9,052
5-AA	WM Salt Removal- H Area	9,066
9-AA	WM In-Tank Precipitation/Extended Sludge Process	26,313
12-AA	WM New Waste Transfer Facility	6,694
15-AA	WM Solid Waste Disposal Facility	27,404
16-AA	WM Low-Level Waste Disposal	14,104
17-AA	WM Effluent Treatment Facility	21,040
19-AA	WM Consolidated Incineration Facility Support	10,345
482-AL	WM Sanitary Landfill Operations	5,000
<u>Waste Management Construction</u>		
2-AL	WM Replacement High Level Waste Evaporation	15,795
25-LA	WM Hazardous Low Level Waste Processing Tanks	15,300
<u>Defense Waste Processing Facility</u>		
570-AA	DWPF Technical Vitrification	35,703
573-AA	DWPF Works Engineering - Vitrification	7,554
576-AA	DWPF Production - Vitrification	15,031
577-AA	DWPF Production - Saltstone Z Area	12,218
<u>WM Program-Wide ADS</u>		
1-AA	WM H- Area General	35,703
1-AD	WM Effluent Treatment Facility Building Maintenance	2,306
1-AE	WM Solid Waste Disposal Facility Area General	7,554
1-AH	WM F - Area General	15,031
579-AA	DWPF Human Asset & Development & Site Services - Vitrification	12,218
580-AA	DWPF Human Asset & Development & Site Services - Saltstone Z Area	1,459
581-AA	DWPF Human Asset & Development & Site Services - Saltstone Y Area	0
Total		365,095

Environmental Restoration Assessments: -- For purposes of illustration, two ER assessments were included in the cost comparison -- RCRA/CERCLA Basins Investigations (ADS 306-AA) and ER-Underground Storage Tanks Assessments (ADS 314-A). The combined cost for the two ADSs is displayed in Table 5. ER assessments include activities associated with site investigations, the performance of feasibility studies and risk assessments for possible remediation.

The RCRA/CERCLA Basins Investigations project requires RI/FSs for 14 CERCLA waste units. These units are comprised of various storage basins and canals associated with facility processes. Where A-E contractor direct labor was involved, a labor multiplier of 2.41 was used to calculate direct labor and contractor overhead split. This compares to the Corps labor multiplier of 2.27 to 2.52.

The ER-Underground Storage Tanks (USTs) Assessment project requires an evaluation of active process and fuel tanks to determine leakage. Solvent tanks located in the old radioactive waste burial grounds will also be evaluated and closed, and all remaining inactive USTs will also be evaluated. Where Westinghouse direct labor will be involved, a labor multiplier of 3.615 was used to determine direct labor and contractor overhead. A labor multiplier of 2.41 was used for direct labor by A-E design firms. Again, this compares to the Corps labor multiplier of 2.27 to 2.52.

The ER program-wide ADSs were distributed over the unvalidated field estimate funding level for the total of the Environmental Restoration Assessment and Cleanup Project ADSs. In this example, a percentage of these program-wide ADSs was then distributed to the project ADSs 306-AA and 314-A, to appropriately compare projects costs with Corps project costs.

Specific Findings

Cost comparisons by project type are shown in Tables 5 - 9. Overhead costs were found to be higher by 140 percent or \$150 million. This difference is attributed to higher contractor overhead rates for engineering services and construction and the use of subcontractors by the M&O. In many cases, it was difficult to determine the contingency costs with any degree of accuracy. Where DOE could not identify contingency costs in the budget estimates, the analysis included an assumed a value of zero. The value for contingency applied to the comparable Corps projects was based on professional judgment. In one case (Waste Management Operations), no contingency was assigned since this activity involves day to day operations rather than construction. In a second case (DPWF activities), Corps contingencies were assumed equal to DOE contingencies. In general, the comparison for contingencies (a small portion of total project costs) showed a high degree of variability.

Table 5

**DOE/Corps Cost Comparison
Environmental Restoration Assessments
ADSs 306-A and 314-A
(dollars in thousands)**

Overhead Category	DOE Cost (\$)	DOE (%)	Corps Cost (\$)	Corps (%)	Percent Difference (1)
Project Management	367	7.1	120	2.4	205.8
Program Direction	203	3.9	301	5.9(2)	-32.6
Contractor Overhead	1,367	26.5	832	16.3(3)	64.3
Subtotal	1,937	37.6	1,253	24.6	54.6
Direct Costs	3,006	58.3	3,006	59.0	0
Contingency	6	0.1	665	13.0(4)	-99.1
Escalation	206	4.0	175	3.4	17.7
Total	5,155	100.0	5,099	100.0	1.1

1. The difference between DOE and Corps estimates is expressed as a percent of the Corps estimate.
2. 10 percent of total direct costs were used to calculate program direction.
3. 152 percent of direct design, 25 percent of direct drilling, and zero percent of laboratory costs were used to calculate contractor oversight.
4. 15 percent of total project costs was used to calculate contingencies.

Table 6

DOE/Corps Cost Comparison
Environmental Restoration Cleanups (1)
ADSs 245-C, 247-C, 302-C, 309-C, 314-C, 342-C, 469-C, and 470-C
(dollars in thousands)

Overhead Category	DOE Cost (\$)	DOE (%)	Corps Cost (\$)	Corps (%)	Percent Difference (2)
Project Management	2,548	6.7	586	1.7	334.8
Program Direction	731	1.9	1,612(3)	4.6	-54.7
Contractor Overhead	16,854	44.5	9,945(4)	28.5	69.5
Subtotal	20,133	53.1	12,143	34.8	65.8
Direct Costs	14,651	38.7	14,651	42.0	0
Contingency	1,661	4.4	6,973	20.0	-76.2
Escalation	1,453	3.8	1,099	3.2	32.2
Total	37,898	100.0	34,866	100.0	8.7

1. Environmental Restoration Cleanups include activities associated with the closure of facilities and with the design and construction of remedial actions.
2. The difference between DOE and Corps estimates is expressed as a percent of the Corps estimate.
3. 11 percent of direct costs were used to calculate program direction.
4. 152 percent of direct design labor, 40 percent of direct construction costs, and zero percent of lab analysis were used to calculate contractor overhead.

Table 7

DOE/Corps Cost Comparison
Waste Management Operations (1)
ADSs 1-AB, 1-AI, 2-AA, 2-AL, 3-AA, 5-AA, 9-AA,
12-AA, 15-AA, 16-AA, 17-AA, 19-AA, 482-AL
(dollars in thousands)

Overhead Category	DOE Cost (\$)	DOE (%)	Corps Cost (\$)	Corps (%)	Percent Difference (2)
Project Management	14,943	5.8	4,290	2.5	248.3
Program Direction	58,558	22.7	12,870(3)	7.4	355
Contractor Overhead	67,409	26.1	42,899(4)	24.6	57.1
Subtotal	140,910	54.5	60,059	34.5	134.6
Direct Costs	107,248	41.5	107,248	61.6	0
Contingency	0	0	0(5)	0	--
Escalation	10,340	4.0	6,860	3.9	50.7
Total	258,498	100.0	174,167	100.0	48.4

1. Waste Management operations include activities associated with the day-to-day operations of liquid and solid

waste. Thirteen waste management ADSs comprise this composite project.

2. The difference between DOE and Corps estimates is expressed as a percent of the Corps estimate.

3. 12 percent of total direct costs were used to calculate program direction.

4. 40 percent of direct costs were used to calculate contractor overhead.

5. DOE and Corps contingencies are assumed to be equal.

Table 8

DOE/Corps Cost Comparison
Waste Management Construction (1)
ADSs 2-LA and 25-LA
(dollars in thousands)

Overhead Category	DOE Cost (\$)	DOE (%)	Corps Cost (\$)	Corps (%)	Percent Difference (2)
Project Management	2,914	5.0	848	2.5	243.6
Program Direction	2,524	4.3	1,696(3)	5.0	48.8
Contractor Overhead	22,057	37.6	6,338(4)	18.8	248
Subtotal	27,495	46.8	8,882	26.4	209.6
Direct Costs	21,195	36.1	21,195	63.0	0
Contingency	7,665	13.1	2,348(5)	7.0	226.4
Escalation	2,348	4.0	1,233	3.7	9.4
Total	58,703	100.0	33,658	100.0	74.4

1. Waste Management Construction includes two large line-item construction projects.
2. The difference between DOE and Corps estimates is expressed as a percent of the Corps estimate.
3. 8 percent of total direct costs were used to calculate program direction.
4. 152 percent of direct design and 20 percent of direct construction were used to calculate program direction.
5. 7.5 percent of escalated total costs were used to calculate contingency.

Table 9

DOE/Corps Cost Comparison
Defense Waste Processing Facility (1)
ADSs 570-AA, 573-AA, 576-AA, 577-AA
(dollars in thousands)

Overhead Category	DOE Cost (\$)	DOE (%)	Corps Cost (\$)	Corps (%)	Percent Difference (2)
Project Management	5,560	4.1	1,792	2.0	210.3
Program Direction	30,570	22.5	5,377(3)	5.9	468.5
Contractor Overhead	31,026	22.9	17,922(4)	19.7	73.1
Subtotal	67,156	49.5	25,091	27.6	167.6
Direct Costs	44,805	33.1	44,805	49.3	0
Contingency	18,193	13.4	18,193(5)	20.0	0
Escalation	5,423	4.0	2,866	3.2	89.2
Total	135,577	100.0	90,955	100.0	49.1

1. The Defense Waste Processing Facility includes activities required for the construction, start-up and operation of the vitrification and saltstone production.
2. The difference between DOE and Corps estimates is expressed as a percent of the Corps estimate.
3. 12 percent of the total direct costs were used to calculate program direction.
4. 40 percent of the total direct costs were used to calculate contractor overhead.
5. DOE and Corps contingencies are assumed to be equal.

The review also found the following factors contributed to higher program costs:

- ***Lack of federal oversight.*** — The site relies primarily on the use of contractors for inherently government functions. M&O contractors prepare project specifications, budget estimates and independent contractors review these documents. Overhead rates used by the contractors were accepted at face value by DOE. However, such overhead rates may include inappropriate costs or be distributed over an inappropriate base. Without a detailed audit of accounting practices relating actual project costs to budget estimates, it is difficult to determine if the current overhead rates paid to the site contractors are reasonable. As mentioned earlier, Westinghouse as the M&O contractor, is in the process of implementing a system to track project costs.

- ***"Worst-case" budgeting.*** — The analysis found that the scope of work and the cost estimates were based on worst case assumptions. For example, the budget request assumes the maximum number of samples will be analyzed and the largest amounts of soil or groundwater will be treated at the highest possible cost. For most environmental restoration activities reviewed, the budget request reflected an excessively conservative scenario, rather than actual site conditions.

Recommendations

- The management and operating contractor should pursue implementation of the new cost accounting system, IBARS, at the earliest possible date.
- The number of federal personnel with technical and cost engineering expertise should be increased to provide more direction and guidance during project and budget formulation.
- The contracting philosophy that mandates contracting of virtually all functions should be reviewed, and contracting methods should be reviewed with the goal of improving competition.
- HQDOE should provide guidance to field offices to allow them to budget for something less than "worst case" in all aspects of the environmental restoration program. While any one project may need the "worst-case" funding, it is unlikely DOE nationwide would require all "worst-case" funding.

DOE Headquarters

Results in Brief

The HQDOE ADSs were reviewed for contracting, management, and cost estimating procedures. A cost and overhead comparison was performed after reviewing approximately 25 percent of the HQDOE program. When contractors were used to support the Headquarters program, contractor overhead costs were consistently higher for DOE than would be expected by the Corps for similar work. Differences in these overhead costs are attributed to the variations between Corps and DOE contracting practices. There can be no clear savings unless DOE contracting and management methodology is changed.

A significant percentage of the HQDOE budget request was found to be management reserve. DOE considers management reserve as a contingency to fund unanticipated requirements. Management reserve amounts requested are based on past experience, and the use of carryover funds has been minimal. The review found that management reserve may be high at HQ because the anticipated work has not been identified or scoped.

Finally, the cost of analytical testing of transuranic waste (TRU) wastes scheduled for FY 1998 and beyond may increase because insufficient laboratory facilities exist to test such wastes. A DOE project, ADS HQ-3032-02, to provide such a facility, was deleted from the FY 1993 budget request. This action may have a significant impact on managing TRU wastes at DOE facilities.

Process

The team was divided into three subteams to review the ADSs at HQDOE. Subteam one reviewed all ER ADSs for legal justification and conducted a detailed cost review of eight ADSs. Subteam two reviewed the Technology Development Sheets (TDSs) for legal justification and one TDS in detail for cost. Subteam three reviewed all ADSs in the WM program for legal justification and two ADSs in detail for cost.

The activities at Headquarters are substantially different from the study, design, and construction activities at project sites. The comparisons between DOE costs and "comparable Corps projects" as described in the introductory chapter of this report, were therefore not made. Instead, the Headquarters cost analysis focused on the details within the estimates.

Specific Findings

Environmental Restoration ADSs. -- The total ER program for the FY 1993 budget request, is \$87.0 million. The cost review covered 41 percent or \$35.9 million of the FY 1993 ER program (the ADSs reviewed are listed in Table 1).

For ADSs HQ-2-00 through HQ-16-00, funds can be transferred from one ADS to another and utilized where needed. Consequently the entire amounts estimated in these ADSs (\$21.5 million), is considered to be management reserve (see Table 2). Funding requests are based on the historical level of effort required to support the program, plus escalation and any known program changes.

ADS HQ-100-AA. -- DOE provided backup cost data for this ADS. These data included existing contracts and interagency agreements that have options through FY 1993 as shown in Table 3. The total costs of the FY 1993 options were estimated to be \$24.0 million. For four of the five contracts with private firms, contractor overhead costs could be identified, through the application of factors provided by the controllers. These four contract FY 1993 options totaled \$12.4 million. Of this amount, contractor overhead was \$3.6 million, or 29.2 percent.

In addition to the expected contractor costs shown in Table 3, HQ-100-AA includes a management reserve of \$1.1 million. The sum of contractor and management reserve costs is equal to the FY 1993 budget request level of \$25.1 million.

Technology Development Sheets. -- Technology Development Sheets (TDSs) have only recently been required by DOE. DOE advised the Corps that the process for TDSs is still evolving and that data has not been developed beyond FY 1993. The FY 1993 request for TD is \$358 million.

The overall strategy of the TD program was explained. First priority was placed on funding projects with fairly obvious problems in common at several sites, e.g., organics in soils, where technology development is needed. Projects in ER were placed ahead of those supporting WM because of schedules for issuing RODs and the need for the availability of technology in making decisions. All DOE sites were surveyed to determine technology needs. Surveys involved questions about media involved, type of contaminants, current available technology, and lack of technology that needs to be developed. TD focuses on applied research in solving specific problems and developing integrated approaches to avoid duplication among the various field sites. Basic research is also conducted under other non-TD programs that are not associated with EM.

Table 1

**Headquarters Environmental Restoration ADSs
Included in the Review of Costs**

ADS Number	Purpose of Funding
HQ-2-00	Provides technical support to the facility and site activities under the ER program. Assistance is provided to HQDOE Program Management on specific technical topics for individual remedial action projects.
HQ-3-00	Provides technical support to facility and site D&D activities under the ER program. Assistance is provided to HQDOE Program Management on specific technical topics for individual decommissioning projects including projects formerly part of the Surplus Facilities Management Program, the Defense D&D Program, and D&D projects from the Office of Energy Research.
HQ-4-00	Provides technical and program Management Support to the Eastern Area Off-Site Branch of EM-42, more specifically to the Formerly Utilized Sites Remedial Action Project (development and maintenance of program data bases; technical review of reports and documentation; and support to field activities).
HQ-5-00	Provides general support to projects within Formerly Utilized Sites Remedial Action Project (technologies and system studies and special studies).
HQ-13-00	Provides general support to the HQ Management of the Uranium Mill Tailings Remedial Action Project and the Uranium Mill Tailings Groundwater Restoration Project by the Southwestern Area Programs Division, Off-Site Remediation Branch (technical support, visuals, technology and system studies and special studies of disposal options).
HQ-15-00	Provides general support to projects and activities supported under the ER program (technical support, visuals, system studies, and special studies of cleanup options).
HQ-16-00	Provides general support to projects and activities under the ER program (technical support, visuals, system studies and special studies of cleanup options).
HQ-100-AA	Provides support to the HQ Office of Environmental Restoration (EM-40) helping EM-40 to carry out its legislative, regulatory, policy, and management functions.

Table 2

**Management Reserve for
HQ-2-00 through HQ-16-00
(dollars in thousands)**

ADS Number	Management Reserve
HQ-2-00	14,033
HQ-3-00	5,700
HQ-4-00	550
HQ-5-00	165
HQ-13-00	620
HQ-15-00	200
HQ-16-00	200
Total	21,468

Table 3

**Contractor and Other Agency
Support for DOE FY 1993 HQ-100-AA
(dollars in thousands)**

Contractor/Agency	Contractor Overhead	Contract Cost for FY 1993	Overhead as Percent of Total Projected Costs
BDM International	1,680	6,000	28.0
Maria Elena Torano Associates Inc.	1,025	2,500	41.0
Weston	750	3,000	25.0
Norman J. Gerstein Inc.	153	850	18.0
Subtotal for Contracts with Contractor Overhead	3,608	12,350	29.2
Martin Marietta	--	9,500	--
Environmental Protection Agency	--	1,000	--
National Academy of Science	--	1,200	--
Total	--	24,050	--

TDS D-1, DOE HQ -- The total cost for TDS-D-1 was estimated to be \$52 million or, 14.5 percent of the TD budget request. Management reserve for this activity was estimated to be \$19 million, or 63.5 percent of the total. Four major components are funded under this TDS:

- Program Research and Demonstration Announcements (PRDAs) are a new activity intended to ensure that private industry has a major role in the development and use of new and emerging technologies. DOE allocated \$24 million in FY 1992 for these proposals. DOE estimates that, of the FY 1992 initiatives, approximately \$16 million will show enough promise to receive additional funding in FY 1993. They also will fund \$24 million in new initiatives for a total of \$40 million in FY 1993. Each PRDA contains several topics for proposal (e.g., removal of volatile organics in soil) and targets \$8 million for contract award. Each proposal is expected to be in the range from \$200,000 - \$500,000.
- IAGs are for funding efforts of other Federal agencies that assist DOE in EM. Seven to nine IAGs are now in place, including two with EPA. A range of \$5 million to \$7 million is proposed for IAG funding.
- Unsolicited Proposals are received by DOE for EM activities. Most of these are rejected upon evaluation; however, \$2 million to \$4 million is estimated to be awarded in FY 1993 for promising proposals.
- HAZWRAP is a program at Oak Ridge and is designed to provide hazardous waste assistance to other federal agencies. HQDOE also tasks HAZWRAP to perform specific activities e.g., development of a waste information network (WIN) and to conduct a worldwide assessment of electrokinetics. Approximately \$3 million to \$4 million was programmed in the FY 1993 budget request for this program to execute future known requirements.

Overhead rates for these projects will vary by contractor. The Defense Contract Audit Agency (DCAA) conducts audits of contract overhead after contracts have been awarded. DOE contracting has established standard rates for contractor overhead.

Waste Management -- Support for the Site Operations Division--ADS HQ-3032-01. -- This ADS is broken into seven sub-activities which provide technical and logistical support services for the Site Operations Division, Office of Waste Operations. Primary activities were broken into the following categories:

- Site Operations and NEPA Activities. This funding provides for government owned/contractor operated and/or support services contractors to prepare NEPA documents related to the Waste Operations Program. The topics of the NEPA Documents include both programmatic and specific proposed actions. Specific activities were not identified and all funding is included as management reserve.

- Site Operations Program Improvements. This funding provides for HQDOE and Operations Office activities and initiatives which establish formal standards, the establishment of a strict system of control and accountability, and to coordinate technology with other countries. However, specific detailed scopes of work were not available for FY 1993. These funds were included in Program Direction.

- Cesium Capsule Source Recovery Project. This funding supports loading, transportation, and return of DOE-owned Cesium Capsules leased to private industry. In addition, sites where the Cesium Capsules have leaked are also being decontaminated as part of this project. The FY 1993 cost estimate is based on the actual costs incurred in FY 1989 and FY 1990. The majority of the work is scheduled to be completed in FY 1992, but there will be some clean-up work continuing through FY 1997. The extent of contamination is not known and can not accurately be determined until the Cesium Capsules are removed.

- Off-site Generated Waste Management. This funding provides for the management of materials, for which DOE is legally responsible, but are not generated on DOE sites. Materials included are: waste which DOE accepts for public health and safety reasons from NRC licensees; materials which are given or leased to public agencies by DOE; and special materials which are in the possession of other government agencies. The acceptance of TRU waste from Nuclear Fuel Service in Erwin, Tennessee, by Oak Ridge Operations is also covered in this ADS.

- Commercial Waste Management Demonstration. Funds are used to support initiatives to involve the private sector in the treatment and disposal of DOE waste where DOE sites lack adequate treatment and disposal capability. This activity has been unfunded in the past and was slipped from the FY 1993 budget to the FY 1994 budget.

- Independent Reviews of Site Operations. These funds support the reviews of safety, quality assurance, environmental documents and activities for ongoing operations. No known specific requirements were identified and all of these funds are considered management reserve.

- Special EM-32 Projects Identified in FY 1993. These are also considered management reserve.

The total cost for ADS HQ-3032-01 is \$9.4 million. This includes \$2.4 million for contractor oversight for work on the independent review of site operations and site program improvements. As explained to the review team, the work will utilize several subcontractors to the prime M&O contractor. The Corps would contract these activities directly to minimize overhead costs.

Waste Analytical Laboratory -- ADS HQ-3032-02. -- This ADS was reviewed because the funds programmed in FY 1993 were decreased from \$10 million in unvalidated field estimate to zero dollars in the validated target levels. The project involves constructing a facility to

analyze waste samples contaminated with TRU elements. Currently, several critical EM projects are paralyzed by federal and/or state waste characterization requirements. Based on available information related to the anticipated volume of TRU mixed waste, there is strong evidence that at least one additional TRU waste analysis facility will be urgently needed in less than five years to support the needs of six separate DOE facilities.

The total estimated cost for the design and construction of this facility is \$293 million. DOE has not made a firm commitment to construct this laboratory and funding for this project was deleted from the FY 1993 budget request. However, the DOE Project Manager stated that it will be impossible to construct and operate the facility by the required date unless predesign and site selection begins in FY 1993. The possibility of private sector funding and construction was acknowledged. However, initiatives to have the private sector fund and construct this facility appear neither feasible nor expeditious without guarantees from DOE for substantive future analytical workload. Guarantees of this nature cannot be made by a government agency.

Recommendations

- The scopes of work for the ADSs that have significant management reserve funds should be strengthened to provide more details concerning anticipated specific projects.
- DOE Headquarters should review its allowable contractor overhead amounts and subcontracting practices in order to minimize payments to contractors for overhead.
- If the TRU analytical laboratory is built in the future, it should be funded and constructed by DOE.

Appendix

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF MANAGEMENT AND BUDGET
WASHINGTON, D.C. 20503

September 26, 1991

The Honorable Nancy P. Dorn
Assistant Secretary for Civil Works
Department of the Army
Room 2E-570
The Pentagon
Washington, D.C. 20310

Dear Nancy:

I am writing as a follow-up to my letter of August 28th and to our recent meetings to request formally the assistance of the Corps of Engineers in analyzing a highly complex set of issues associated with the Environmental Restoration and Waste Management program at the U.S. Department of Energy.

The President is and has been committed to seeing that the Federal government takes its environmental cleanup obligations seriously, and he has demonstrated his commitment by allocating significantly increased amounts of resources to the task. As you may know, the President has increased the budget available to the Department of Energy for these activities from \$1.76 billion when he took office in 1989 to approximately \$4.4 billion in the coming fiscal year, an increase of almost 150 percent in just two and one-half years. It is likely that investment in this area will continue to increase.

We would like the Corps' assistance in several areas. First, we would like to understand explicitly the relationship between activities proposed by the Department of Energy's Environmental Restoration and Waste Management (EM) program and the requirements of compliance agreements that the Department of Energy (DOE) has signed with the Environmental Protection Agency (EPA) and various state governments, court orders or consent decrees, and applicable Federal and state regulations and statutes. This should include an analysis of program progress and plans for the current and budget year in meeting legally binding deadlines. Secondly, we would like the Corps' assistance in identifying the remedy selection (preferred cleanup alternative) assumed for each site an operable unit within each site in the budget request and the five year plan of the EM program and in determining whether this particular remedy selection was required by a compliance agreement, consent order or decree, or statute or regulation. Thirdly and finally, we would like the assistance of the Corps in analyzing the overhead,

administrative, contingency, and other costs included in the EM program's cost estimates for the coming fiscal year, and comparing them to similar costs in analogous Federal and private sector design and construction projects.

Let me be more specific about our request in each of these areas:

I. Activities of the Environmental Restoration and Waste Management Program and Their Relationship to the Requirements of Compliance Agreements, Court Orders, and Federal and State Statutes:

The Environmental Restoration and Waste Management (EM) program is currently conducting activities at dozens of sites around the country. The magnitude of the effort varies greatly from site to site. Attachment 1 provides a summary list of the sites, along with the Department of Energy's (DOE) proposed dollar spending at that site as proposed to OMB in the fiscal year 1993 budget. For the overwhelming majority of these sites, DOE has signed a compliance agreement with the EPA and the relevant state government.

Despite several requests, the EM program has been unable to identify in detail which of the specific activities for which it is requesting funding in the coming year are required by compliance agreements and which are not. Moreover, the Department has not been able to provide OMB with a validated, detailed analysis of the funding necessary to meet the specific requirements of compliance agreements, nor has it provided any requested detail on how program progress and plans for 1992 and 1993 are directed at meeting legally binding deadlines.

In order to address this critically important question, several steps are being taken. First, I have asked Secretary Watkins to provide OMB with the Activity Data Sheets (ADSSs) for each of the 3200 activities being undertaken by the EM program at DOE sites. In addition, I have asked the Secretary for a cross-walk table which identifies which of these activities are required by compliance agreements. Using this material, and undertaking sites visits to the major sites, an OMB team will be providing as part of our review of DOE's budget an assessment of which activities are required by the compliance agreements.

Secondly, Secretary Watkins, in addition to requesting this information from the EM program itself, has commissioned an independent cost evaluation of each activity by the DOE's Director of Procurement, Assistance and Program Management.

I am asking the Corps to provide a third source of critically needed input. Because of the Corps' long experience

in designing and undertaking complex construction projects, I believe that it has the ability to provide perhaps the most detailed analysis of all those currently assisting in addressing this problem.

For each of DOE's major sites, I would be grateful if the Corps could attempt to answer the following questions:

- o For each activity proposed in activity data sheet (ADS):
 - Is the activity specifically required by a compliance agreement? If so, please cite the agreement and the number of the page which contains the specific requirement.
 - Is the activity specifically required by a consent decree or a consent order from a court? If so, please cite the decree or order and the page number thereof which contains the specific requirement.
 - Is the activity specifically required by a Federal statute or regulation. If so, please reference the citation in statute or regulation which specifically requires the activity.
 - Is the activity specifically required by a state statute or regulation. If so, please reference the citation in statute or regulation which specifically requires the activity.
 - Is the activity discretionary? If the activity is not required by an affirmative answer to one of the above four questions, then the presumption is that the activity is discretionary. If this is not the case, please explain.

When we have received your answers to these questions for a specific site or set of sites, as well as the comparable responses from the OMB staff review and the independent cost analysis of the DOE's Office of Procurement, Assistance, and Program Management, I would propose to review the results with a senior level review team, composed of officials who have been actively involved in the Administration's efforts to clean up Federal Facilities. In addition to myself, the review team will consist of the following individuals:

W. Henson Moore, Deputy Secretary of Energy
 F. Henry Habicht II, Deputy Administrator, EPA
 Barry Hartman, Acting Assistant Attorney General, Department
 Justice

David Berteau, Principal Deputy Assistant Secretary for
Production and Logistics, Department of Defense

When this review team has completed its work, I believe we will be in a much better position that we are currently to judge what level of resources is necessary to fulfill the Department's legal obligations in cleaning up Federal Facilities, and to ensure that an appropriate level of resources is included in the President's budget for fiscal year 1993 and future years.

II. Remedy Selections Assumed in the Budget Estimates and the Five Year Plan of the Environmental Restoration and Waste Management Program and Their Relationship to Requirements Contained in Compliance Agreements, Court Orders, and Federal and State Statutes.

OMB's preliminary analysis of the compliance agreements and spending plans at selected major DOE sites indicates that a key component of the EM program's spending plans is the remedy selection assumed for operating units in the development of such plans. It is therefore essential to understand the nature of the assumed or implied remedy selection at each site.

Consequently, a second set of questions we would ask the Corps to assist in answering for each activity data sheet at each DOE site is as follows:

- To what extent is the activity deemed necessary as a result of the presumed selection of a particular cleanup remedy at the site?
- Is this presumed remedy selection specifically required by a compliance agreement? If so, please cite the agreement and the page number which contains the specific requirement.
- Is this presumed remedy selection specifically required by a consent decree or consent order from a court? If so, please cite the order and the page number which contains the specific requirement.
- Is this presumed remedy selection specifically required by a Federal statute or regulation? This should include an analysis of whether the proposed remedy completion schedule is based on a legally binding deadline or is discretionary. If so, please reference the citation in statute or regulation which specifically requires the selected remedy.
- Is this presumed remedy selection specifically required by a state statute or regulation? If so, please

reference the citation in state statute or regulation which specifically requires the selected remedy.

- If the answer to the above five questions is no, are alternative remedies possible under applicable Federal and state law. If so, please describe these possible remedies. If possible, provide a cost estimate for the comparable activity which could be pursued under an alternative remedy selection.

When the answers to these questions have been provided, I believe it would also be appropriate for the senior level review team to review these responses, and it would be my intention to convene the review team for this purpose.

III. Administrative, Overhead, Contingency and Other Costs Contained in the Spending Estimates of the Environmental Restoration and Waste Management Program.

A preliminary review of the planned cleanup activities at one of DOE's major sites reveals a significant amount of planned spending on administrative, overhead, and other such costs which may be able to be controlled through more effective management. At one major site, for example, a preliminary review indicates that fully 27% of the spending identified in the ADSs can be classified as overhead.

We would like the Corps' assistance in identifying and analyzing these costs.

We believe that the following categories of costs, at a minimum, should be included in such an analysis:

Overhead-Related ADSs:

- Project Management: This category includes ADSs that include such items as project management, financial planning, staff management, and landlord functions.
- Program Direction and Contractor Oversight: This includes such items as coordination, management of contractors, and overall management.
- Contractor Overhead: This category includes overhead expenditures included in contractor activities and fee structures.
- Headquarters Program Direction and Support: This includes such items as headquarters and field office direction, office space, and administrative expenses.

- Base Services: This includes operation and management of basic utilities and maintenance services, and security.
- Support: This category includes ADSs for such activities as training, communications services, worker safety programs, quality management, and procedural support.

Operating Unit Cleanup Program ADSs:

- Construction Contingency Accounts: Planned spending at sites includes substantial amounts for "contingencies" above and beyond currently planned construction activities.
- Escalator Clauses: Similarly, planned spending at a number of sites includes provisions for assumed cost escalation.

We would appreciate your assistance in identifying these costs at each of the DOE sites, and your estimate of their share of total spending at each site. In addition, we are especially interested in your response to the following two questions for each of the above:

- What is the Corps' estimate of the proportion of total spending for each of these activities in comparable Federal design and construction projects?
- What is the Corps' estimate of the proportion of total spending for each of these activities in comparable design and construction projects in the private sector?

Schedule:

I realize that this request entails an enormous amount of work for the Corps. We believe, however, that the Corps has the experience and analytic capacity to accomplish it effectively. Because so many sites are involved in the review outlined above, I believe the most effective procedure would be to convene the senior level review team once a week over a number of weeks later in the fall and winter to review the results of the analysis for each site or set of sites as it is completed. I would propose the following schedule for the meetings of the senior level review team:

Week of 10/21/91 - 10/25/91: Review results for sites under the purview of the Fernald operations office.

Week of 11/18/91 - 11/22/91: Review results for sites under the purview of the Chicago and Idaho operations offices.

Week of 11/25/91 - 11/29/91: Review results for sites under the purview of the Rocky Flats and Nevada operations offices.

Week of 12/2/91 - 12/6/91: Review results for sites under the purview of the Oak Ridge and San Francisco operations offices.

Week of 12/9/91 - 12/13/91: Review results for sites under the purview of the Albuquerque and Savannah River operations offices.

Week of 12/16/91 - 12/20/91: Review results for sites under the purview of the Richland operations office and Headquarters activities.

Finally, because we know that the analysis we are requesting will require a substantial commitment of time and personnel from the Corps of Engineers, we will, as we have discussed, work with you to provide for appropriate reimbursement to the Corps under the Economy Act from the Department of Energy for the services provided.

We greatly appreciate your assistance in this important undertaking. I sincerely believe that the result will be a greater ability of the Administration to honor the President's commitment to the environment within a world of limited resources.

Thank you again.

Sincerely,

Robert E. Grady
Associate Director
Natural Resources, Energy, and
Science

Attachment

cc: W. Henson Moore, Deputy Secretary of Energy
F. Henry Habicht II, Deputy Administrator, EPA
Barry Hartman, Acting Assistant Attorney General, Department of Justice
David Berteau, Principal Deputy Assistant Secretary, Production and Logistics, Department of Defense

Department of Energy
Environmental Restoration and Waste Management
Operations Office/Installation Table
EM Totals

20-Sep-91

ATTACHMENT 1

Operations Office Location	FY 1993 OMB Budget Request			FY 1993 FYP
	Defense	Non-Defense	Total	Case 1
Albuquerque				
AL Ops	30,729	0	30,729	49,953
ITRI	0	3,182	3,182	3,182
Kansas City Plant	19,891	0	19,891	20,755
Los Alamos Nat'l Lab	150,898	1,952	152,850	209,694
Mound Plant	34,628	1,065	35,693	45,522
Pantex Plant	35,002	0	35,002	45,850
Pinebluffs Plant	8,472	0	8,472	13,433
Sandia, Livermore	6,064	0	6,064	6,237
Sandia, Albuquerque	73,823	0	73,823	92,705
UMTRAP	0	107,075	107,075	127,182
UMTRA-CR	0	4,600	4,600	12,000
Waste Isolat'n Pilot Pl	185,000	0	185,000	202,000
Total, Albuquerque	544,507	117,874	662,381	828,513
Chicago				
Ames Lab	2,856	564	3,420	4,569
Argonne N L (East)	5,096	19,852	24,948	51,145
Argonne N L (West)	50	3,149	3,199	3,779
Battelle Columbus	110	14,243	14,353	19,717
ANL - Weldon	0	1,400	1,400	1,400
Brookhaven National Lab	2,059	11,956	14,015	26,070
CH Ops.	5,453	1,333	6,786	9,313
FERMILAB	0	3,147	3,147	3,318
FUSRAP - ANL	0	675	675	675
Princeton Plasma Ph Lab	0	1,027	1,027	2,081
UMTRAP - BNL	0	370	370	370
Total, Chicago	15,624	57,716	73,340	122,437

Department of Energy
Environmental Restoration and Waste Management
Operations Office/Installation Table
EM Totals
(Cont'd)

Operations Office Location	FY 1993 OMB Budget Request			FY 1993	
	Defense	Non-Defense	Total	FYP	Case 1
Formald	311,291	0	311,291		475,337
Idaho					
Grand Junction	600	15,153	15,753		30,600
Idaho Chem Process	145,290	0	145,290		158,287
Idaho Natl Engng Lab	221,864	1,809	223,673		292,145
Idaho Ops	43,945	0	43,945		71,068
UMTRAP-CUPO	0	29,025	29,025		29,025
West Valley	0	124,000	124,000		134,000
Total, Idaho	411,699	169,967	581,666		715,125
Nevada					
Nevada Off-Site	52	0	52		520
Nevada Ops	50,082	0	50,082		91,076
Total, Nevada	50,134	0	50,134		91,596
Oak Ridge					
OR Gas Diff. Plant	193,746	0	193,746		281,931
OR Natl Lab	69,717	90,696	160,413		294,249
OR Assoc. Univer.	3,540	700	4,240		7,278
Prodcah GDP	25,720	0	25,720		28,860
Portsmouth GDP	15,000	0	15,000		20,249
Weldon	0	50,963	50,963		50,963
Y-12	103,975	0	103,975		155,472
Oak Ridge Ops	36,123	0	36,123		97,954
FUSRAP	0	39,510	39,510		39,522
UMTRAP	0	210	210		210
Total, Oak Ridge	447,821	182,079	629,900		976,688

Environmental Restoration and Waste Management
Operations Office/Installation Table
EM Totals
(Con't)

Operations Office Location	FY 1993 OMB Budget Request			FY 1993 FYP	
	Defense	Non-Defense	Total	Case 1	
Richland					
Pacific NW Labs	37,194	0	37,194	67,700	
Hanford	892,264	50,071	942,335	1,289,146	
Richland Ops	171,020	693	171,713	257,279	
Total, Richland	1,100,478	50,764	1,151,242	1,614,125	
Rocky Flats					
	180,865	0	180,865	296,442	
San Francisco					
Energy Tech Eng Center	0	0	0	200	
Lawrence Berkeley Lab	0	5,346	5,346	9,383	
Concha Park	0	0	0	0	
Lawrence Livermore NL	97,299	0	97,299	131,031	
Santa Susana	285	4,900	4,785	6,278	
San Francisco Ops	3,164	94	3,258	4,274	
Stanford Linear Acceler	0	1,891	1,891	2,763	
General Electric	0	2,532	2,532	4,547	
General Atomic	0	0	0	3,468	
U.C. Davis	0	3,638	3,638	3,638	
Total, San Francisco	100,748	18,001	118,749	165,582	
Savannah River					
	560,398	250	560,648	820,538	
TOTAL, OPS OFFICES	3,723,565	996,671	4,720,236	6,106,383	

Department of Energy
Environmental Restoration and Waste Management
Operations Office/Installation Table
EM Totals
(Cont'd)

Operations Office Location	FY 1993 OMB Budget Request			FY 1993	
	Defense	Non-Defense	Total	FY 1993 FYP	Case 1
HEADQUARTERS					
Facilities and Sites	29,987	10,759	40,746	56,503	
Headquarters	194,080	12,080	206,160	372,318	
Apollo	0	0	0	0	
Program D1/ - HQ	100,418	0	100,418	116,734	
Program D1/ - Field	27,450	0	27,450	0	
FUSRAP	0	715	715	715	
UMTRAP	0	620	620	620	
TOTAL, HEADQUARTERS	351,935	24,174	376,109	506,892	
TOTAL, EM	4,075,500	620,845	4,696,345	6,693,275	