

Report to Congressional Requesters

October 1992

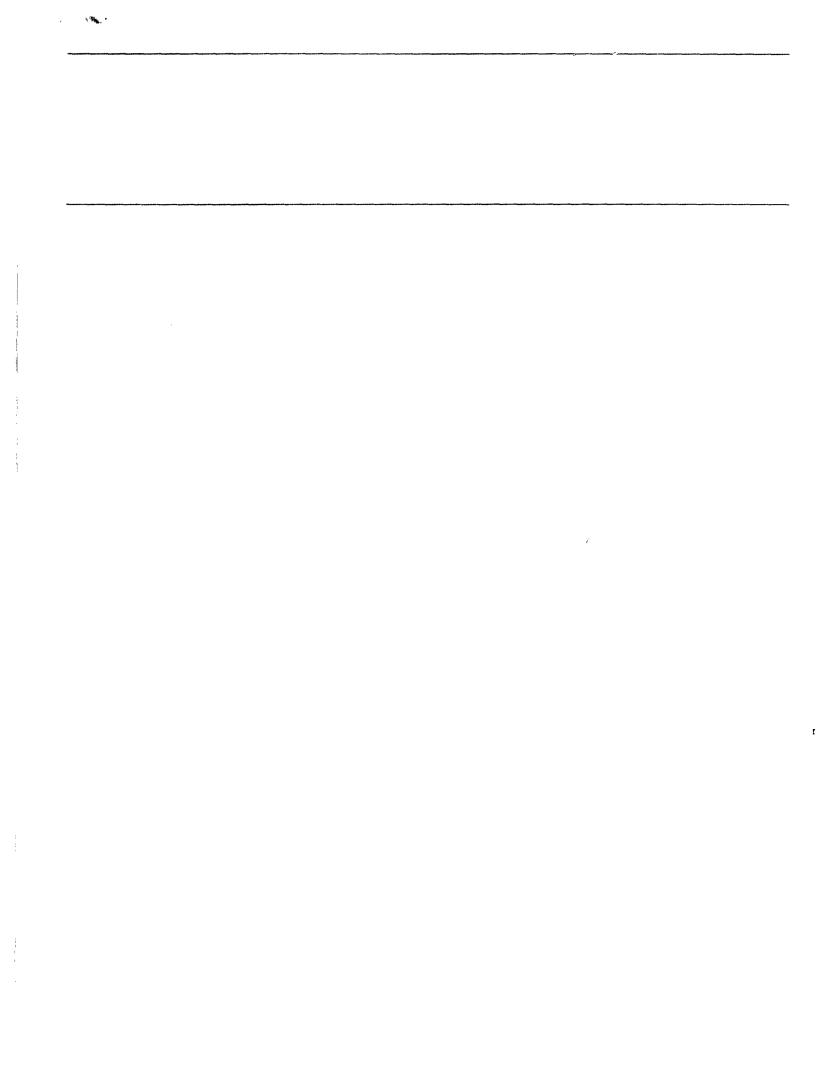
DEPARTMENT OF ENERGY

Project Management at the Rocky Flats Plant Needs Improvement





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United States General Accounting Office Washington, D.C. 20548

Resources, Community, and Economic Development Division

B-241574

October 16, 1992

The Honorable Timothy E. Wirth United States Senate

The Honorable David E. Skaggs House of Representatives

This report responds to your June 1992 requests that we review the adequacy of the implementation of the project management process at the Department of Energy's (DOE) Rocky Flats Plant in Colorado. This process is intended to vest authority and responsibility for project execution to an individual, called a project manager, who provides focus on the planning, organization, direction, and control of all project activities. In implementing the process, DOE assigns a project manager who provides general oversight of the project, while the plant contractor, EG&G, assigns a project manager who directs the day-to-day project operations.

In two previous assignments, we found that inadequate implementation of the project management process at Rocky Flats had led to substantial cost increases and schedule delays for two specific projects—construction of a plutonium recovery and waste treatment facility and cleanup of solar evaporation ponds.¹ (See app. II.) Notwithstanding DOE assurances of corrective action regarding project management implementation for these two projects, your offices expressed concern that inadequate project management implementation may be a more widespread problem at the plant.² Therefore, as agreed with your offices, this report examines (1) whether DOE's and EG&G's implementation of the project management process has led to problems affecting any additional projects at Rocky Flats, (2) what DOE and EG&G have done to identify project management problems, and (3) what corrective actions DOE and EG&G have planned or taken.

Results in Brief

Inadequate implementation of the project management process has led to problems affecting certain projects at Rocky Flats. Through discussions with DOE and EG&G officials, we identified two ongoing projects—the supercompactor and upgrades to the plant's low-level waste transfer

¹Construction Management Problems Have Delayed Completion of the New Plutonium Facilities at Rocky Flats, Colorado (GAO/PSAD-78-90, June 2, 1978) and Nuclear Safety and Health: Problems With Cleaning Up the Solar Ponds at Rocky Flats (GAO/RCED-91-31, Jan. 3, 1991).

²As a part of this review, we did not determine if DOE had taken corrective action on these two Rocky Flats projects.

system—that have experienced substantial cost growth over the past 4 years. The supercompactor increased from \$1.9 million to \$10.5 million, and the waste transfer system increased from \$1.5 million to \$14 million.³ In both cases, according to DOE and EG&G officials, project managers did not properly oversee the early stages of the projects' development. Regarding other projects at the plant, we noted that DOE has not always prepared the required departmental documentation intended to ensure that projects are accomplished within cost estimates and on schedule. As a result, we were unable to determine if these projects experienced substantial cost growth or experienced schedule slippage.

Over the past year, DOE and EG&G issued four studies that evaluated Rocky Flats' project management process. The studies identified strengths as well as weaknesses in the process. For instance, one strength identified was an extensive effort to bring in DOE personnel that are involved in and familiar with project management concepts and techniques. In regard to weaknesses, the studies made about 100 recommendations to correct weaknesses and improve EG&G's and DOE's Rocky Flats project management process. For instance, the studies recommended that the current EG&G project reporting system be improved to provide sufficient data for day-to-day management of projects by project managers.

In response to the studies' recommendations, EG&G developed, in February 1992, a 15-point corrective action plan to resolve its project management problems and has made progress toward implementing these corrective actions. Approximately 50 percent of EG&G's actions are being implemented on schedule. In contrast, DOE Rocky Flats has not yet developed a comprehensive corrective action plan of its own with detailed tasks and specific milestones. Therefore, we could not determine whether problems identified with DOE's Rocky Flats project management were being addressed by DOE.

Background

The Rocky Flats Plant carries out more than 100 projects for DOE related to defense and environmental restoration. (See app. I.) To ensure that these projects are carried out according to cost and schedule estimates, DOE has developed a project management process as described in DOE Order 4700.1 (Mar. 6, 1987).

Two fundamental elements of the DOE project management process are establishing clear lines of responsibility and management accountability.

³Cost growth is defined to be the difference between the original and the current estimated cost.

The first is achieved, in large part, by assigning to each project a doe field office project manager who devotes sufficient time overseeing the project to ensure that it is successfully completed. The doe project manager is usually dedicated full-time to an individual major system acquisition. On other smaller projects, one project manager may have authority and responsibility for one or more projects, depending on technical complexity. At the contractor level, a project manager is assigned who is responsible for the day-to-day, hands-on operations.

Management accountability is achieved, in large part, by requiring the preparation of project documentation. This documentation includes detailed information on cost, schedule, and technical expectations. This documentation is necessary to ensure, to the maximum extent practical, the successful execution of the project. One of the key documents required by the DOE project management process is a project plan that must be approved prior to or at the project start. This plan, which sets expectations at the outset of a project, is required for each major system acquisition and recommended for any other project whose total cost exceeds \$15 million.

Project Management Problems at Rocky Flats

Project management implementation has adversely affected certain projects at Rocky Flats. We identified two ongoing projects that have experienced substantial cost growth and schedule delays because of improper project oversight. Each project was initially estimated to cost less than \$2 million, but because of oversight problems, the cost estimate for each project has increased more than fivefold. We also noted that some large programs lacked sufficient project management documentation to assess, among other things, if costs were increasing.

Supercompactor Problems

The first project is the supercompactor—a device designed to reduce in volume the transuranic waste stored at the plant. The project was started in 1987 and is still ongoing. According to DOE officials, during the project's first year, a DOE project manager was not assigned to this project because of a lack of communication between DOE Rocky Flats' Construction and Engineering Division and Waste Management Division.⁵ In addition, according to EG&G officials, the assigned contractor personnel on-site at

⁴According to DOE guidance, a major system acquisition has a total project cost in excess of \$100 million.

⁶The DOE Rocky Flats' Construction and Engineering Division has overall responsibility for construction projects at the plant.

the time were not properly trained or experienced in project management. The net effect was that no one was properly overseeing the project to ensure, for example, that the "low-bid" vendor offered a high-quality product and was financially stable.

Consequently, when the supercompactor was delivered on-site in 1989 for set-up and pre-operational testing, it did not operate as intended and, according to DOE officials, it was not returned because the vendor did not have the financial resources to make the necessary modifications. DOE decided to finance all design changes itself, including, but not limited to, fixing basic alignment problems, which inhibited the compactor piston from completely compressing the waste. Accordingly, the estimated cost for this project has increased from about \$1.9 million to about \$10.5 million, and the scheduled date of operation has slipped from December 1991 to December 1992.

Low-Level Waste Transfer System Problems

The second project prevents water seepage into and waste leakage out of the 20 underground vaults that provide secondary containment for the plant's low-level hazardous waste transfer system. This project was started in 1988 and is still ongoing. According to the DOE Rocky Flats' Chief, Construction Branch, not enough staff were available to assign a DOE project manager to properly oversee the project, and, according to EG&G officials, the contractor project manager was not qualified. As a result, the contractor project manager did not properly examine the containment problem or determine an effective solution.

Three attempts have been made to ensure secondary containment in the underground vaults. The contractor first painted the interior walls of all 20 vaults with epoxy paint. However, the hydrostatic pressure of the water in the surrounding soil was so great that the paint degraded. Next, the contractor installed a plastic liner in all 20 vaults. The liner material, however, was too thin to withstand the hydrostatic pressure. To complicate matters, additional problems arose when the contractor purchased check valves for placement in all 20 vaults that failed to meet specifications. As a result, the valves did not operate properly. Subsequently, the contractor reinstalled liners and valves in all 20 vaults, which, according to DOE officials, appears to have resolved the problems.

⁶The system is required to transfer waste from the various locations at the plant to the waste system evaporators.

⁷The check valves facilitate, by pressurization, the flow of material in the low-level hazardous waste transfer system.

The attempts to remedy the problems led to cost increases—from about \$1.5 million to about \$14 million. The scheduled completion date slipped from January 1989 to January 1993.

Lack of Documentation for Other Projects

During our review, we also noted that two Rocky Flats programs (series of projects) lacked sufficient documentation to assess the extent to which project management implementation may have caused cost increases and/or schedule delays. In particular, each of these two programs is part of a DOE-wide major system acquisition for which an overall project plan has not been approved. DOE's project management process requires the preparation of an overall project plan and approval by DOE headquarters prior to or at project start.

The two major system acquisitions without an approved project plan are the (1) Facilities Capability Assurance Program and (2) Environmental, Safety, and Health Enhancements Program. Both acquisitions have projects ongoing at various DOE locations, including Rocky Flats. The first acquisition provides for the replacement and rehabilitation of facilities necessary to produce and maintain nuclear weapons. This acquisition started in 1988, and the Rocky Flats portion has a total estimated cost in excess of \$100 million. The second acquisition provides environmental, safety, and health enhancements sitewide. This acquisition started in 1990, and the Rocky Flats portion has a total estimated cost of about \$80 million.

For each of these acquisitions, DOE officials provided us reasons why an approved project plan did not exist, as of September 1992. They said that a draft project plan for the Facilities Capability Assurance Program was prepared as early as 1988 but has undergone numerous changes. The latest revision, dated May 1992, is now in the DOE headquarters/field office review process. DOE officials said that the Department intends to initiate a project plan for the Environmental, Safety, and Health Enhancements Program, but that requires the designation of a project manager first. These officials added that normally such an individual is designated before work begins, but the urgency associated with starting this project led to events occurring out of sequence. Notwithstanding the present status of these acquisitions, a project plan for both is more than 2 years overdue.

⁸DOE has designated the Albuquerque Field Office responsible for project plan preparation for both programs, with input from other locations.

DOE and EG&G Studies on Project Management

DOE and EG&G have issued, since November 1991, four separate studies of the implementation of the project management process at Rocky Flats, each with a different scope and/or study objective. Although these studies found strengths in how DOE and EG&G implemented the project management process, the studies identified numerous weaknesses with regard to the adequacy of staffing, procedures, reporting, and oversight. Collectively, the studies contained about 100 recommendations to improve project management at the plant.

The first study—an independent assessment by an individual consultant sponsored by DOE Rocky Flats' Construction and Engineering Division—was issued in November 1991 and focused on the DOE division sponsoring the study. The study identified numerous concerns, including no overall plan of action and insufficient documentation indicating the progress of projects. We believe one of the more important concerns the study identified was that DOE was not providing sufficient oversight of the contractor. The study noted that DOE's and EG&G's active project lists had numerous discrepancies; for example, projects on EG&G's list did not appear on DOE's list. Furthermore, many projects did not have an assigned DOE project manager.

The second study, an EG&G business management review, was also issued in November 1991 and listed 12 strengths of the current project management process and 40 specific areas needing improvement. The reported strengths centered on how EG&G was organized. The project management areas needing improvement pertained to both DOE and EG&G and involved primarily staffing, documentation, and oversight. For example, the study found that current resources within both DOE and EG&G appeared to be inadequate to manage all authorized and funded projects and support DOE's oversight role. Another major finding was that the current EG&G project reporting system was inadequate to inform management of project condition and did not provide sufficient data for day-to-day management of the project by project managers.

The third study, a DOE business management review, was issued in January 1992 and repeated many of the specific strengths and weaknesses reported

⁹Independent Assessment of the Rocky Flats Construction and Engineering Division Project Management Process (Nov. 1991).

¹⁰DOE Business Management Systems Review—EG&G Rocky Flats (Nov. 1991). A business management review is a comprehensive evaluation of field activities, including budgeting, planning, procurement, and project management.

in the previously mentioned EG&G study. ¹¹ The DOE study noted that an extensive effort has been made to bring in DOE personnel that are involved in and familiar with project management concepts and techniques. The DOE study further noted two new areas needing improvement. These two areas were that DOE personnel were not involved in the formal approval of schedules identifying how long it would take to complete projects and that evaluation reviews on completed projects did not provide feedback leading to project management improvements.

The last study, a draft DOE assessment of environmental restoration project management at the plant, was issued in June 1992 and recognized that project management was a major area needing improvement. ¹² For example, the study determined that major changes to the current management system were needed in order to manage large environmental restoration projects in accordance with DOE guidance. Another major change needed was an increase in oversight by DOE. The study noted that DOE's Rocky Flats office had not provided EG&G with specific guidance or directives to ensure that the principles of project management were clearly understood. The study concluded that, as a result, no formal implementation and understanding of this guidance or its principles existed. The environmental restoration study also reported that staffing needs within EG&G's and DOE's Rocky Flats offices had not been adequately satisfied.

Adequacy of Rocky Flats' Corrective Action Plans

EG&G has developed a corrective action plan in response to one of the studies and has implemented approximately 50 percent of its planned actions on schedule. The remaining actions are behind schedule. Furthermore, the plan may not include all needed corrective action. DOE has not yet developed a comprehensive corrective action plan of its own. Accordingly, how DOE will prioritize and address the studies' recommendations is not clear.

EG&G's Corrective Action Plans

EG&G grouped the problems identified in its business management review into 15 areas and, in February 1992, issued a corrective action plan for each. Each plan designated the EG&G staff responsible for the corrective

¹¹Self-Assessment: Headquarters Business Management Systems Review—DOE Rocky Flats (Jan. 1992).

¹²Draft Rocky Flats Environmental Restoration Major System Acquisition Program Assessment—DOE Office of Environmental Restoration (June 1992).

actions, identified specific tasks, defined expected products, and set completion milestone dates.

On the basis of EG&G status reports, it appears that the contractor has made progress toward implementing its corrective actions. For instance, EG&G reported, in August 1992, that it has improved project scheduling, controlled cost and schedule changes, prioritized all projects, trained project managers, and improved reporting. Our analysis of EG&G's August 1992 report shows that about 50 percent of the activities were on schedule and the remaining were, on average, about 3-1/2 months behind schedule. EG&G's Facilities and Project Management Division Acting Director told us that EG&G is behind because of staff resource constraints.¹³

EG&G's plans may not address problems with EG&G project status reports. During our review, we noted that at least four EG&G project status reports are prepared—a construction management summary (weekly), an active project list (monthly), a project status summary (monthly), and a project manager's progress report (quarterly). These reports, however, do not always provide consistent information. Specifically, the reports have, in certain cases, provided inconsistent information about which projects are active, how near to completion various projects are, and whether projects are being completed within cost estimates and on schedule.

The EG&G Rocky Flats' manager of project support services acknowledged that these reports contained inconsistent data. He also said that these inconsistencies need to be resolved; however, no specific information on how to eliminate these inconsistencies has been included in EG&G's corrective action plans. In our view, this problem of inconsistent data should be addressed in EG&G's plans.

DOE's Efforts to Develop a Corrective Action Plan

In contrast to EG&G's corrective action initiatives, DOE Rocky Flats has not yet prepared a comprehensive corrective action plan with detailed tasks and completion milestone dates. DOE Rocky Flats has drafted an improvement plan which provides a general framework for improving operations at the plant. This plan, however, does not address the specific recommendations of the previously mentioned studies. Many recommendations in those studies pertain to DOE Rocky Flats' project management process. These studies contained about 100 recommendations, of which 65 required some type of action by DOE Rocky

¹³The Facilities and Project Management Division has overall responsibility for project management within the EG&G organization at Rocky Flats.

Flats management. These actions included, among others, that DOE Rocky Flats

- establish a plantwide vision for project management;
- employ sufficient staff to properly oversee the large number of EG&G projects;
- develop a complete list, working with EG&G, of all active projects; and
- initiate a training program for project management to ensure staff expertise is adequate.

DOE Rocky Flats officials told us that although some of the studies' recommendations have been implemented, other recommendations, such as the need to develop a complete active project list, have not been implemented because of plant priorities and staff resource constraints. The officials said that they recognize the need to develop a comprehensive corrective action plan based on the studies' recommendations. The officials pointed out that one action in the draft improvement plan is to prepare a corrective action plan. We observed, however, that DOE has only recently designated an individual to draft this corrective action plan. Furthermore, DOE Rocky Flats has not established a date for completing the corrective action plan. Therefore, we could not determine the comprehensiveness of this plan or the priority DOE has assigned to its completion.

From our review, we identified other project management problems not specifically mentioned in any of the studies that need to be resolved in DOE's final plan. For example, DOE Rocky Flats has not developed guidance that clearly describes the respective project management roles and responsibilities of its Construction and Engineering, Waste Management, and Environmental Restoration Divisions. Because no such guidance exists, a lack of communication ensued between the Construction and Engineering and Waste Management Divisions on the supercompactor and, as a result, during the first year no project manager was assigned to the project. Problems on this project led to cost increases and schedule delays. This problem was not identified in any previous studies.

According to DOE Rocky Flats officials, the need for guidance on roles and responsibilities for the various Rocky Flats divisions has been known since problems arose with the supercompactor 3 years ago. A DOE official within the Construction and Engineering Division said that he is drafting the guidance and expects to have it completed by October 1992. The official did not know, however, when the final guidance would be ready.

Conclusions

Various studies conducted at the Rocky Flats Plant have identified numerous project management weaknesses, and, on the basis of our review, these weaknesses have adversely affected certain projects at the plant. Both EG&G and DOE have taken steps to address some of these weaknesses, but we are concerned that their actions may not be as comprehensive as necessary to systematically prioritize and address all project management recommendations and to ensure that all problems are being resolved.

EG&G has developed various corrective action plans and has made progress in implementing them. However, the corrective action plans were based only on EG&G's business management review study and may not include some important corrective actions that are needed. For example, we found that various management reports contained inconsistencies that could affect project management at the plant. This problem is not being addressed in any of EG&G's corrective action plans. We believe that DOE should ensure that the EG&G plans are as comprehensive as possible and address all major problems.

DOE officials told us that they have addressed problems cited in previous project management studies but have not developed a comprehensive corrective action plan with detailed tasks and completion milestone dates. DOE officials believe such a plan is necessary and have designated an individual to draft a plan. However, DOE still needs to define the plan's scope and establish a date when the plan would be completed. We also noted in our review that clearly defined project management roles for the various operating divisions at the plant have not been defined even though this problem has existed for 3 years. Any comprehensive corrective action plan should address the need to clearly define the project management roles of various divisions at the plant.

Recommendations

We recommend that the Secretary of Energy direct DOE Rocky Flats officials to

- review existing EG&G corrective action plans to ensure that all major problems are being addressed and
- develop and implement a comprehensive DOE Rocky Flats corrective
 action plan with detailed tasks and completion milestone dates. At a
 minimum, such a plan should prioritize and review for possible
 implementation all recommendations from previously prepared project
 management studies.

Views of Agency Officials

We discussed the information in this report with DOE Rocky Flats' Assistant Manager for Operations and Director, Construction and Engineering Division; DOE Defense Programs' Director, Rocky Flats Program Office; and EG&G Rocky Flats' Director, Project Support Services Division, and Acting Director, Facilities and Project Management Division. We have included their views where appropriate. In their comments, both DOE and EG&G officials stressed that considerable progress has been made in improving the project management process at Rocky Flats. These officials said that the project management process nevertheless needs improvement and that DOE recognizes that improvements need to be made. These officials added that DOE Rocky Flats management is confident that the improvements being made will result in a project management system that will meet and exceed DOE's expectations. As agreed with your offices, we did not obtain written agency comments on a draft of this report.

To perform our work, we met with and obtained data from DOE and EG&G officials at Rocky Flats. We also met with DOE Albuquerque Operations Office, Defense Programs, and Environmental Restoration and Waste Management officials. Our work was performed from June to September 1992 in accordance with generally accepted government auditing standards. Appendix III discusses our scope and methodology in more detail.

As arranged with your offices, unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days after the date of this letter. At that time, we will send copies to the appropriate congressional committees; the Secretary of Energy; and the Director, Office of Management and Budget. We will also make copies available to others upon request.

This report was prepared under the direction of Victor S. Rezendes, Director, Energy and Science Issues, who may be reached at (202) 275-1441. Major contributors to this report are listed in appendix IV.

J. Dexter Peach

Assistant Comptroller General

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Abbreviations

DOE Department of Energy
GAO General Accounting Office

History of Rocky Flats Operations

Rocky Flats is located in Jefferson County, Colorado, at the base of the Rocky Mountains. Rocky Flats covers a total of approximately 11 square miles, of which 350 acres are used for actual operations. Rocky Flats is located 16 miles northwest of downtown Denver and 12 miles from the surrounding communities of Boulder and Golden. The closest community, Arvada, recently annexed land that borders the Department of Energy (DOE) property.

The Rocky Flats Plant began operations during the early 1950s. The plant's primary mission has been to fabricate plutonium components for nuclear weapons and to carry out associated plutonium processing and waste management activities. The plant also manufactures nonplutonium components for weapons from materials such as stainless steel and beryllium. In November 1989, plutonium production and production-support activities were suspended until the contractor could make improvements to overall safety and to the conduct of operations involving plutonium. Accordingly, for approximately 2 years, significant work has occurred to improve the safety, rigor, and discipline associated with maintenance, testing, and operation of the plant.

Events, however, have altered the situation at Rocky Flats significantly since September 1991. Specifically, on September 27, 1991, the President announced the cancellation of several nuclear weapons programs. Subsequently, on January 28, 1992, in his State of the Union address, the President announced further cuts to the nuclear weapons stockpile. This latter decision eliminated the only existing or planned plutonium component production requirements for the plant.

Due to the absence of any production requirement, the Rocky Flats Plant is being transformed from a production-dominated to an environmental restoration, cleanup, and waste management-dominated site. Preliminary assessments under DOE's environmental restoration program have identified 178 release sites at the plant, including 3 off-site reservoirs and 1 land area located off DOE property. The off-site areas may have received contaminated effluents and sediments originating from the plant. In 1989, Rocky Flats was placed on the Environmental Protection Agency's national priorities list of the nation's worst hazardous waste sites.

Previous GAO Work Has Cited Project Management Problems at Rocky Flats

In two previous assignments, we identified that the Department of Energy's (DOE) Rocky Flats Plant had not exercised adequate project management control over two specific projects it has undertaken. As a result, both projects have experienced unnecessary cost growth and schedule delays.

One project was the construction of a plutonium recovery and waste treatment facility. We reported that DOE Rocky Flats management did not have a formal management plan, adequate design control, realistic schedules, sound cost estimating and control practices, and a timely phased contract award for mechanical equipment installations. This caused, among other things, numerous design changes requiring considerable rework and one contractor interfering with another contractor's work. These problems led to a \$47 million cost growth and a 1-1/2 year schedule delay.

The other project was the cleanup of solar ponds used to store and evaporate low-level radioactive and hazardous liquid waste.² We reported that DOE Rocky Flats did not have sufficient program control mechanisms in place, such as a detailed plan that established benchmarks to monitor performance and control cost. This led to inadequate oversight of contract work. As a result, the contractor improperly mixed the pond sludge with cement in making large concrete blocks for disposal, causing thousands of blocks to subsequently crumble and crack. In addition, the contractor packaged the blocks in fiberwall boxes that were unsuitable for long-term storage when exposed to the weather and deteriorated. These problems have contributed to a more than \$100 million cost growth and a more than 1-year schedule delay.

¹Construction Management Problems Have Delayed Completion of the New Plutonium Facilities at Rocky Flats, Colorado (GAO/PSAD-78-90, June 2, 1978).

²Nuclear Safety and Health: Problems With Cleaning Up the Solar Ponds at Rocky Flats (GAO/RCED-91-31, Jan. 3, 1991).

Scope and Methodology

To achieve our objectives, we met with and obtained data on Rocky Flats project management from DOE officials in the Offices of Defense Programs and Environmental Restoration and Waste Management at DOE headquarters; DOE officials at the Albuquerque Field Office; and DOE and EG&G officials at the Rocky Flats Plant in Colorado. We obtained a listing of the more than 100 active projects at Rocky Flats. Through discussions with DOE officials, we identified two projects that have been specifically impacted by a lack of project management. We also obtained various studies that have identified DOE Rocky Flats' and EG&G's project management problems and various documents on DOE's and EG&G's efforts to develop corrective action plans. In addition, we discussed with DOE and EG&G officials their perspectives on project management roles and responsibilities at Rocky Flats and the inconsistencies of the various reporting systems at Rocky Flats that provide project-specific status information. Our work was performed from June to September 1992.

Major Contributors to This Report

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