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Report to the Chairman, Environment, Energy, and Natural Resources Subcommittee, Committee on Government Operations, House of Representatives

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NUCLEAR HEALTH AND SAFETY

Problems Continue for Rocky Flats Solar Pond Cleanup Program

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Resources, Community, and
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The Honorable Mike Synar
Chairman, Environment, Energy, and
Natural Resources Subcommittee
Committee on Government Operations
House of Representatives

Dear Mr. Chairman:

On January 3, 1991, we issued a report to you on the Department of Energy's (DOE) efforts to clean up the solar evaporation ponds at its Rocky Flats Plant in Colorado.[1] DOE's cleanup activities, which began in 1985, involve excavating ponds used for storing and evaporating low-level radioactive and hazardous waste and solidifying the material in a waste form known as pondcrete. In our report, we provided information on the cleanup program's escalating costs, inadequate plans, limited progress in completing the pondcrete project, and large volume of work remaining to be done to meet the milestones agreed to with the state of Colorado.

In response to our report, DOE issued a March 15, 1991, press release that discussed the report and the pondcrete situation. In the press release, DOE stated that a number of actions have been taken to improve the management of the project, including the adoption of strict cost controls and detailed planning guides. DOE also stated that it had begun the process of remixing degraded pondcrete blocks and had not missed any milestones contained in compliance agreements involving the cleanup of Rocky Flats.

In June 1991, we agreed with your office to follow up on DOE's solar pond cleanup activities. Specifically, this report provides updated information on (1) the estimated cost of the project, (2) the status of the detailed plans for conducting and monitoring the program, (3) the status of cleanup activities, and (4) the specific milestones that DOE has met or missed in conducting pondcrete activities.

Results in Brief

Although DOE stated in its press release that it has imposed strict cost-control measures, DOE's most recent cost data show that the total cost

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

for the solar ponds cleanup program has escalated to an estimated $169 million through completion in 2009—$50 million more than the amount we reported 9 months ago. DOE attributes these increases primarily to increased labor costs, higher inspection and maintenance expenses, and the inclusion of waste burial expenses in the program's costs.

Delays have occurred in the completion and approval of the management plans for conducting and monitoring the program. Final approval of the project management plan—detailing how the project is to be carried out—was delayed to incorporate the activities of a subcontractor and did not occur until September 1991. Development of the program management plan—describing how DOE will manage and monitor remediation projects—was suspended until officewide program management policies and practices were established; plan approval is now expected in early fall 1991. The absence of these plans has been an underlying problem with the pondcrete activities.

Cleanup activities that DOE expected to resume by December 1990 have not yet begun. According to DOE officials, pondcrete operations for mixing existing sludge are not expected to begin until June 1992. Remixing of the degraded blocks is not scheduled to begin until August 1992.

DOE will not meet the first major milestone related to the solar ponds program—cleaning up the ponds and moving all pondcrete off site by October 1991. Further, unless DOE provides adequate project funding and/or resolves concerns over pondcrete disposal in Nevada, it will not finish pondcrete processing before Rocky Flats' interim status permit for pondcrete operations expires in November 1992.

Background

The Rocky Flats Plant is located on a 6,550-acre site about 16 miles from Denver, Colorado. Currently operated by EG&G under a contract with DOE,[2] the plant's primary mission has been to produce plutonium component parts for nuclear weapons. Such operations involve the routine handling and disposal of radioactive, hazardous, and/or toxic materials. However, because past handling and disposal of these materials was not always conducted in a manner to prevent environmental contamination, DOE now faces a large environmental cleanup at the plant.

[2]EG&G took over the plant's operation on January 1, 1990, from the Rockwell International Corporation, North American Space Operations Group.

One of the highest-priority environmental remediation efforts at the plant has been cleaning up the five solar evaporation ponds. These ponds are surface excavations for storing and evaporating various liquid wastes. Some of these ponds have leaked waste into the ground. On-site monitoring has shown that the groundwater has been contaminated with radioactive material, nitrates, and heavy metals.

DOE began phasing out use of the solar ponds in the early 1980s because of environmental concerns. DOE planned to clean up the ponds by draining and treating the liquid waste and mixing the pond sediment with cement. The resulting solidified sediment, known as pondcrete, was to be disposed of at DOE's Nevada Test Site (NTS). However, improper mixing of cement and sludge resulted in some pondcrete blocks that crumbled, cracked, and were soft enough to be dug into with a stick. Since the discovery of the pondcrete problems in May 1988, DOE has not cleaned up any additional sediment from the solar ponds. Additionally, in May 1990, NTS was closed to additional waste shipments from Rocky Flats and other DOE facilities pending completion of an environmental assessment of the site's disposal activities.

As discussed in our January 1991 report, about 2,000 pondcrete blocks had already been buried at NTS before the problems were discovered. Since that time, 8,666 blocks have been inspected, repackaged, and shipped to the test site for storage, and 8,031 blocks are awaiting remixing and repackaging at Rocky Flats. Substantial additional work remains to be done to clean up the ponds. DOE expected to resume pondcrete operations in December 1990 and to complete and implement a detailed program management plan to direct the cleanup efforts. At this time, however, pondcrete operations have not yet resumed.

Cost Escalation

In January 1991, we reported that the cost of the solar pond cleanup project has been increasing significantly. DOE did not initially estimate costs for the project, but in July 1989 it estimated that cleanup would cost about $27 million in fiscal years 1990 through 1995. In April 1990, DOE raised its cost estimate for fiscal years 1990 through 1995 to about $50 million—an increase of over 87 percent. At that time, DOE estimated that the total project would cost $119 million by completion in 2009.[3]

[3]In our previous report, the project's total estimated cost was identified as $112 million in constant 1989 dollars. For this report, estimated costs are in 1991 dollars.

Although DOE stated in its press release that it had taken steps to control project costs, recent data show that the estimated cost for the project has risen substantially. According to July 1991 data provided by DOE, the estimated cost for the total project is now about $169 million—42 percent higher than the April 1990 estimate. Furthermore, the total costs for fiscal years 1990 through 1995 are now estimated by DOE to be $131 million.

DOE attributes the program cost increases primarily to revised labor rates, higher inspection and maintenance expenses, and waste burial fees. According to data provided by DOE's Rocky Flats office, labor rates for fiscal year 1991 and beyond are approximately 46 percent higher than previously estimated. Furthermore, inspection and maintenance costs have increased as pondcrete is now stored on pads at the site since NTS is closed for waste shipments. DOE officials said that program costs rose $29 million as a result of these two cost increases.

In addition, the program must now bear the cost for waste burial at NTS. DOE officials said that the cost for this activity was previously not included in program cost estimates because DOE headquarters was planning to provide a direct transfer of funds to NTS to provide for the burial activities. However, in March 1991, DOE decided that, consistent with cost procedures for other projects, the solar pond cleanup project would directly bear its waste burial costs. This increased the cost estimate by $15.8 million.

DOE officials added that they are taking steps to control costs. In particular, they are negotiating fixed-priced contracts for processing both the remaining sludge and the existing pondcrete blocks into new pondcrete. According to the project officials, the fixed-price contracts will provide a limit to their processing costs and require the contractor to reprocess any new pondcrete found not to meet disposal standards. Additionally, DOE is arranging to keep disposal costs to the program as low as possible by continuing to have funds for pondcrete disposal transferred directly from DOE headquarters to NTS. They said that this will avoid an approximately 20-percent contractor handling charge.

Plan Development

When the solar pond cleanup program began, DOE did not develop plans to manage and monitor the program. Furthermore, DOE did not require, nor did contractor personnel prepare, detailed plans and procedures for carrying out the program. In our January 1991 report, we pointed out that the lack of such plans has been a problem with the cleanup project.

For example, plans establishing key standards, such as minimum hardness of pondcrete blocks, were not developed, leaving the ratio of cement to sludge to the discretion of employees making the blocks. Moreover, without detailed plans, DOE cannot readily determine whether cost estimates and time frames for completing the project are reasonable.

We previously reported that DOE officials are requiring the development of a detailed program plan that will cover such things as the scope of work involved, time frames, cost estimates, and reporting requirements. In addition, DOE's Office of Environmental Restoration is developing a management plan that will spell out how the headquarters office will manage and monitor remediation efforts. DOE officials told us at the time of our first audit that they expected to have the detailed program plan approved by December 1990 and that they would begin to implement the management plan in March 1991.

However, the project plan was not completed and approved until September 1991. According to DOE officials at Rocky Flats, the plan approval was delayed because DOE changed its approach for carrying out the project. Instead of continuing to use the original batch process—which DOE determined to be too slow and costly—it decided to conduct a high-capacity, continuous cementing process and to hire a subcontractor to install and operate the pondcrete process. DOE officials told us that the plans had to be revised to incorporate the activities of this subcontractor, integrate the schedules and site activities of the subcontractor with those of EG&G, and update cost estimates and time frames.

Furthermore, the Office of Environmental Restoration has not yet completed and implemented its management plan. According to Environmental Restoration officials, completion of their management plan was deferred until the Director of the Office of Environmental Restoration and Waste Management had approved and issued program management policies and requirements. These policies and requirements were issued on June 24, 1991, and DOE officials told us that the Office of Environmental Restoration Management Plan is to be issued by the end of fiscal year 1991.

Status of Cleanup Activities

The major efforts that DOE must conduct to clean up the solar ponds include (1) processing or mixing approximately 3,120 cubic yards of sludge into pondcrete and (2) remixing more than 8,000 degraded pondcrete blocks into new pondcrete so that they can be moved off site. As

discussed in our previous report, DOE had expected to resume pondcrete production in December 1990. DOE stated in its press release that a remix facility had been installed and the process of remixing degraded blocks initiated.

However, the facility to remix pondcrete is not yet in place, and the processing of new pondcrete has not been started. DOE did construct a pilot remix facility to develop a solidification formula that would meet regulatory requirements and to evaluate the performance of the prototype equipment. However, DOE officials said that the pilot facility was found to be too labor-intensive to operate and maintain and too slow to meet schedule requirements. Consequently, the pilot remix activities were curtailed, and the decision was made to have a subcontractor for the mixing operations.

As of August 1991, DOE is only in the initial phase of a 3-phase subcontract to conduct mixing operations. This phase of the contract includes planning of the project, characterizing the waste, developing formulas for processing the sludge and degraded pondcrete into new pondcrete, and establishing the associated process costs. The final design and installation of the continuous pondcrete processing system will be conducted under this phase of the contract; however, this system has not yet been installed. DOE does not expect the processing system to be completed and tested until June 1992.

The mixing of existing sludge into pondcrete is now scheduled to begin in June 1992 after the modular system has been installed and tested. According to DOE officials at Rocky Flats, the sludge remaining in the ponds will be mixed first because it poses more of a pollution risk than the degraded blocks that are currently stored within shelters. Rocky Flats officials estimate that about 15,000 blocks of pondcrete will be made from the remaining sludge in the ponds and that this activity will take over 2 months to complete.

The actual remixing of the degraded blocks is not scheduled to take place until late summer 1992. According to the June 15, 1991, project schedule, the remixing activities are to begin as soon as the sludge processing has been completed. The remixing process will start in August 1992 and will be completed in September 1992.

Milestones for the Solar Ponds Project

Rocky Flats' compliance agreements and permits have established numerous milestones that set specific dates for completing cleanup-related activities. DOE stated in its press release that it has not missed any of the milestones contained in its compliance agreements involving operations or cleanup of Rocky Flats. The milestones DOE officials told us they have met include, among other things, initiating groundwater monitoring at various locations, providing reports to Colorado on DOE cleanup actions, and developing work plans for contaminated areas. Only one of these milestones involved the cleanup of the solar ponds. This specific milestone—submission of a draft solar ponds Phase 1 facility investigation/remedial investigation work plan—was achieved on June 8, 1990.[4]

However, DOE will soon miss one significant solar pond milestone because of the current changes to the project. The Agreement in Principle signed by the Secretary of Energy and the Governor of Colorado on June 28, 1989, committed DOE to remove the sludge from the ponds and ship it off site by October 1991. In a June 7, 1991, letter, DOE formally notified Colorado that it will not be able to complete the cleanup project by the agreed date. The letter stated that the magnitude of the project has increased and because of this expanded project scope, the project will not be completed in 1991. DOE further stated that it was unable to establish a completion date at this time.

Moreover, because of program funding limitations and concerns over waste disposal at NTS, the pondcrete activities may not be completed before the November 8, 1992, expiration of Rocky Flats' permit for treating and storing the sludge and pondcrete.[5] DOE officials at Rocky Flats and headquarters said that although the current schedule calls for all pondcrete processing to be completed in September 1992, fiscal year 1992 funding of about $42 million will be required to maintain this schedule. They said that without this level of funding, schedule slippages would occur and the pondcrete would not be removed by the permit expiration date.

[4]This milestone was officially established on January 22, 1991—6 months after it was achieved—by the Interagency Agreement between DOE, the Environmental Protection Agency, and Colorado. However, both DOE and Colorado officials said that the milestone was originally established before its achievement during the development of the agreement.

[5]Rocky Flats is treating and storing sludge under an interim status permit. However, in accordance with provisions of the Resource Conservation and Recovery Act, all interim status treatment and storage facilities must obtain their final permit by November 8, 1992, or proceed into closure. According to an official from the Colorado Department of Health, DOE did not apply for a final permit for this activity.

Officials in DOE's Office of Environmental Restoration do not expect all needed funds to be available for the solar ponds cleanup program in fiscal year 1992. They said that because the pondcrete activities were originally expected to be completed in October 1991, specific funding for solar pond sludge removal and pondcrete processing was not included in DOE's fiscal year 1992 budget request. As a result, no funds from DOE's fiscal year 1992 appropriations are currently allocated for continuation of the cleanup program. The DOE officials added that they anticipate some funds will be made available by DOE management to enable sludge to be removed from the ponds and processed into pondcrete. Nevertheless, funds are not expected to be available to process the degraded pondcrete or to ship pondcrete off site.

Additionally, even if full funding is provided, DOE may not be able to dispose of the pondcrete as planned because of regulatory constraints and the state of Nevada's opposition to the disposal of pondcrete and other low-level mixed wastes. At this time, no low-level mixed wastes can be shipped to NTS. In accordance with the National Environmental Policy Act, DOE is conducting an environmental assessment of mixed waste disposal at the test site, including the effects of pondcrete disposal. Disposal activities can resume without an environmental impact statement (EIS) if the assessment results in a finding of no significant impact. Otherwise, the need for an EIS would cause further delays. In addition, DOE may have to construct engineered disposal facilities—with liners and leachate collection systems—at the NTS facility prior to any further disposal of low-level mixed wastes.

The state of Nevada opposes the disposal of all DOE low-level mixed wastes, including pondcrete, at the test site without additional study. According to the Executive Director of the Nevada Agency for Nuclear Projects, DOE needs, as a prerequisite to any further disposal of pondcrete, to change the test site's mission to include waste disposal activities and to complete a new EIS that includes a complete subsurface site characterization. The Executive Director said that the current EIS for the site does not include the impacts of disposing of mixed waste from other DOE facilities, such as Rocky Flats. He estimated that the development of a new EIS could take 5 years or more to complete. The Executive Director said that if these prerequisites are not met, the state will contest any efforts by DOE to dispose of additional pondcrete.

DOE Perspective

DOE officials at Rocky Flats and headquarters are optimistic that the solar ponds cleanup program is now under control. They said that under

the original cleanup program, insufficient focus was placed on the regulatory and technical requirements necessary to ensure successful completion of the cleanup and inadequate management control existed over the program's execution. DOE officials believe that as a result of lessons learned from their previous efforts, positive actions have been taken not only on the physical requirements to process pondcrete but also on critically important planning, control, and oversight requirements.

Further, DOE program officials believe that as a direct result of the program planning and management control improvements, a much higher level of confidence can be associated with the program's cost estimate. They said that since early 1991, when the draft project plan was first submitted to DOE, program costs have remained stable. Every effort is being made to control project activities and ensure that the plan is followed and successfully completed and, where possible, reduce the costs associated with the conduct of the project.

DOE officials stressed that environmental remediation projects are inherently risky and that some uncertainty will likely continue until the completion of the work. For example, they pointed out that some uncertainty will exist with program costs until studies of waste characterization and treatability, process formulas, and materials handling are completed. Recognizing this uncertainty, program officials said that resources are being dedicated to identify critically important planning, control, and oversight requirements to best ensure that all regulatory issues, federal laws, and waste-acceptance criteria are identified and incorporated into the program.

Conclusions

The contamination caused by the solar ponds at Rocky Flats has been known since the early 1980s, and the remediation of the ponds is a high-priority effort that has been the focus of much of the plant's cleanup activities. As we reported in January 1991, significant problems have slowed the progress of the cleanup. At that time, DOE had taken steps to improve program control, including the development of a detailed program plan, but it was too early to determine the success of these efforts.

Today, 9 months later, the cleanup and disposal of the radioactive and hazardous wastes from the solar ponds at Rocky Flats continues to be a problem for DOE. The estimated costs have continued to escalate, program plans have not been completed and approved, and the resumption of pondcrete activities has been delayed. Furthermore, one significant project milestone—removal of the pondcrete from the site by October

1991—will not be achieved, and the removal of the material before the facility's interim status permit expires is not assured.

In our view, DOE's efforts to resolve these problems have been a step in the right direction, but it is apparent that DOE has not yet turned the corner on this project. The most troubling aspects of the program continue to be the delays in completing the cleanup effort and the continuing increases in the program's estimated costs. The solar pond cleanup project already has a long and costly history, and the final completion of sludge removal and disposal is still uncertain. Consequently, although DOE believes that it has brought project costs under control, we are not convinced that the cleanup and its associated costs will achieve DOE's current schedule.

In the body of work we have performed on the solar pond efforts, we have found that the absence of program plans has hindered the project's successful progress. Such plans provide a roadmap for reaching the program's objectives by (1) establishing benchmarks against which to measure progress and cost control and (2) identifying the funding needed to keep the program on track. In our opinion, without a detailed project plan and a headquarters management plan, DOE management has not had sufficient information to effectively assess the program. Completion of both these plans should provide the necessary information so that DOE management can direct, oversee, and monitor the solar pond cleanup program.

We discussed the information in this report with DOE officials, who agreed that the facts were accurate. However, as agreed with your office, we did not obtain official agency comments on a draft of this report. Our work was performed in June and July 1991 in accordance with generally accepted government auditing standards. Appendix I provides a discussion of our objectives, scope, and methodology.

Unless you publicly announce its contents earlier, we plan no further distribution of this report for 30 days from 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.

If you have any questions about this report, please contact me at (202) 275-1441. Major contributors to this report are listed in appendix II.

Sincerely yours,

Victor S. Rezendes
Director, Energy Issues

Objectives, Scope, and Methodology

In January 1991, we issued a report to the Environment, Energy, and Natural Resources Subcommittee, House Committee on Government Operations, that discussed problems in cleaning up the solar ponds at Rocky Flats. In June 1991, the Subcommittee asked us to follow up on certain information contained in the report and in the Department of Energy's (DOE) March 15, 1991, press release that discussed the report. Specifically, the Subcommittee asked us to update (1) the estimated cost of the project, (2) the status of the plans for conducting and monitoring the program, (3) the status of cleanup activities, and (4) the specific milestones that DOE has met or missed in conducting pondcrete activities.

To achieve these objectives, we had discussions with and obtained data from DOE officials in the Office of Environmental Restoration and Waste Management at DOE headquarters; the Rocky Flats Plant in Colorado; and the Nevada Test Site. From these officials, we obtained the current cost estimates for the solar pond cleanup activities and fiscal years 1991 and 1992 budget data, copies of the pondcrete process development and processing contracts, DOE agreements with the state of Colorado and the Environmental Protection Agency concerning the solar ponds cleanup, and the current draft of the detailed project plan. We also discussed the status of the pondcrete activities and the information contained in the press release with DOE officials and representatives of the Rocky Flats contractor. Furthermore, we discussed issues relating to the disposal of pondcrete at the Nevada Test Site with the Executive Director of Nevada's Agency for Nuclear Projects. This work was performed during June and July 1991 in accordance with generally accepted government auditing standards.

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