U.S. Department of Energy
Office of Inspector General
Office of Audit Services

Audit Report

Management Controls over the Department of Energy's Superconductivity Partnerships

OAS-M-07-01 January 2007

Department of Energy

Washington, DC 20585

January 18, 2007

MEMORANDUM FOR THE DIRECTOR, OFFICE OF ELECTRICITY DELIVERY AND ENERGY RELIABILITY

FROM: George W. Collard
Assistant Inspector General
for Performance Audits
Office of Inspector General

SUBJECT: INFORMATION: Audit Report on "Management Controls over the Department of Energy's Superconductivity Partnerships"

BACKGROUND

The Department of Energy, through its Office of Electricity Delivery and Energy Reliability, funds Superconductivity Partnerships. Each Superconductivity Partnership (Partnership) receives financial assistance primarily through a cooperative agreement with industry to research and develop high-temperature superconducting electric power equipment technologies. These technology projects offer the potential to drastically increase electricity transmission capacity but represent a challenging objective since it is difficult to estimate the probability of success for such projects. Examples of these technologies include generators, transformers, magnetic energy storage systems, superconducting wire, and prototypes that have application in both the commercial and defense sectors. The Office of Electricity Delivery and Energy Reliability develops the mission and objectives for Partnership projects; formulates and justifies the budget; and, provides overall guidance and direction. The Golden Field Office located in Golden, Colorado, is responsible for administering the Partnership cooperative agreements.

As of July 2006, the Office had 16 open projects with a total Federal cost share of approximately $128 million. In prior reports on the use of research and development cooperative agreements, the Office of Inspector General raised concerns over the Department's management of projects. Specifically, the Department did not always implement risk mitigation measures despite signs of risk and was reluctant to withhold, suspend, or terminate funding when it became apparent that the terms of the financial assistance award would not be fulfilled. The objective of this audit was to determine whether the Office of Electricity Delivery and Energy Reliability (Office) had effectively managed financial assistance provided to Partnership projects.

RESULTS OF AUDIT

We noted that while efforts were taken to address certain technical risks, the financial risks were not always addressed, and changes in market conditions were not always fully assessed.

For example, Federal project managers did not identify and manage financial risks associated with funding one project that led to a $3.8 million increase in the Federal cost share. In this case, managers did not:

- Identify the financial risk associated with funding the design of the project when the design specifications depended on the characteristics of a site that had not yet been obtained. In October 2003, the industry partner notified the Federal project managers that it was in negotiations, but had not yet secured a site for the project. Despite knowing this risk, the Office continued funding the project. Negotiations for a site stalled, and a final site was not secured until January 2006. The project incurred duplicative costs for site plans, installation engineering, and design work related to the new site; and the Department paid for 50 percent of these duplicative costs, or approximately $1.8 million.

- Address currency rate fluctuations affecting an international partnership on the above project. Specifically, Federal project managers did not consider obtaining insurance or institute other controls to mitigate the risk that exchange rate fluctuations would occur and increase the Department's financial risk. As a result, the Department's cost share on this project increased by approximately $2 million.

In total, our review identified 5 of the 16 open Superconductivity Partnership projects as needing stronger financial oversight. This resulted from the fact that the Office of Electricity Delivery and Energy Reliability had not developed and implemented polices and procedures that required Federal project managers to:

- Develop a financial risk mitigation plan for each project;

- Ensure that each cooperative agreement clearly delineates the substantial involvement anticipated between the Department and the industry partners; and,

- Use a formal process to evaluate continuing projects when industry partners request termination or notify the Department that markets no longer support the continued financial investment.

Overall, approximately $5 million was expended on redesign work and other unnecessary costs that could have been better spent by the Department in meeting program goals. Also, in one case, the Department may be exposed to further financial risk since the Office plans to spend an additional $2 million to $3 million for demonstration of a technology for which the research and development has not been successfully completed.

Office program officials informed us that they recognized the need for improved financial monitoring at key decision points and were working toward improvements in future Partnership projects. To assist in that effort, we made recommendations to improve the Office's financial management of its Partnership cooperative agreements.

MANAGEMENT REACTION

Management concurred with our findings and recommendations. Their comments were responsive to our recommendations; and their actions, when fully implemented, should improve the management of financial risk of the Superconductivity Partnerships. Management's comments are included in their entirety in Appendix 3.

Attachment

cc: Deputy Secretary
Under Secretary of Energy
Chief of Staff
Manager, Golden Field Office

REPORT ON MANAGEMENT CONTROLS OVER THE DEPARTMENT OF ENERGY'S SUPERCONDUCTIVITY PARTNERSHIPS

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Management of Financial Assistance

The Office of Electricity Delivery and Energy Reliability (Office) did not always effectively manage its financial assistance for 5 of the 16 open Superconductivity Partnership (Partnership) projects. These five projects represent a Federal cost share totaling approximately $43 million. Although technical risks were considered for some projects, the financial risks were not always addressed, and changes in market conditions were not always fully assessed.

Risk Mitigation

In the case of three projects, Federal project managers did not identify and manage financial risks. For one project to develop a cable system, which had a Department of Energy (Department) cost share of approximately $23.4 million, Federal managers provided funding although:

- In October 2003, the industry partner notified the Federal project managers that it was in negotiations to obtain the necessary rights of way to a site, but it had not yet secured a site for the project. Despite knowing this risk, the Federal project managers continued funding the project; and, in order to maintain progress, the industry partner proceeded with the project design based on the specifications of the proposed initial site. Negotiations for a site stalled, and an alternative final site was not secured until January 2006, over two years later. Consequently, the project incurred duplicative costs for site plans, installation engineering, and design work related to the new site. The Department was responsible for 50 percent of these costs, or approximately $1.8 million.

- Various means are available to address the risk of foreign currency exposure, including insurance and fixed exchange rate contracts, none of these were considered when European partners became involved in the project. In July 2004, the industry partner first reported cost overruns due to the exchange rate fluctuations between the dollar and the euro. Nevertheless, Federal project managers did not consider taking action and the overrun amounts continued to increase for another year, to over $4 million. The Department's share of the overruns totaled 50 percent, or approximately $2 million.

Financial risks can also be mitigated by sequentially awarding funds for each discrete phase of work, such as research and development (R&D), demonstration, and commercialization, since the outcome of one phase is generally dependent upon the success

of the prior phase. However, the Office decided in the case of two projects to concurrently fund multiple phases of work without assessing the financial risk should the preceding phase fail.

- In the case of one project to develop a fault current limiter, which is essentially a device used to protect the transmission system, the Office decided to allow the R&D and demonstration phases to be conducted in parallel. The project was awarded in July 2003 and included a Federal cost share of approximately $6 million for the demonstration phase. However, in September 2005, certain elements of the project were placed on hold by the industry partner due to technical problems, and further R&D work was considered necessary. Despite the fact that approximately $4.4 million had already been provided for the demonstration phase, between October 2005 and January 2006, the Federal project managers approved funding for additional R&D through another superconductivity program and obligated an additional $500,000 for demonstration tasks. Although the Federal project managers estimate that an additional $2 million to $3 million is needed to complete the demonstration tasks, there was no evidence that they assessed the financial risks of continuing to fund the demonstration phase despite the technical problems.

- In another case, the Office approved the commercialization tasks of a project prior to the successful completion of the demonstration tasks. The project, approved in September 2002, was to commercialize a flywheel at a Federal cost share of approximately $8 million. Federal project managers obligated an initial $250,000 for commercialization tasks at the time of award, which was timed to coincide with the expected completion date of the demonstration tasks. However, the demonstration project failed during testing in November 2002. Despite this, the Federal project managers did not suspend funding on the commercialization tasks; and, obligated an additional $250,000 several months after the demonstration failure occurred. There was no evidence that Federal project managers assessed the financial risks of continuing to fund the commercialization of the technology after the demonstration failed. Of the $500,000 in total obligated dollars, the industry partner had spent over $363,000 on redesign and purchasing of parts to be used in the commercialization of the project. Federal project managers have since acknowledged the importance of curtailing funding for subsequent phases without the successful completion of prior phases.

By contrast, the Department has successfully demonstrated that Federal dollars can be saved by evaluating projects after the completion of a phase and prior to continuing with follow-on work. For example, one of the 16 Partnership projects we examined required that an informed decision be made at the conclusion of the R&D phase about the suitability and advisability of proceeding to the next phase of the project. The Department evaluated the project at the end of the R&D phase and decided not to continue; accordingly, the project is currently being closed out. In this case, only $613,309 of approximately $5 million of the Department's cost share for the project was expended.

Evaluating Viability of Continuing Projects

Federal project managers decided to continue two projects without the benefit of a formal cost-benefit or market analysis, even though the industry partners requested termination or notified the Department that the markets no longer supported the continued financial investment. According to Office officials, the industry partners have the primary responsibility for evaluating changes in technology and informing the Department of these changes. In turn, Department guidance states that the Department has the responsibility to make sound decisions that ensure the most effective use of funds and to justify the rationale for those decisions.

Despite this, the Federal project managers continued to fund one project even though the industry partner notified them that a sufficient business opportunity did not exist to continue support of the project's technology. The project, awarded in September 2001, was to develop a magnetic separator at a Federal cost share of approximately $4.1 million. However, in January 2004, the original industry partner requested that the Federal project managers approve terminating work on the project and close out the cooperative agreement. The Federal project managers expressed interest in completing the project and denied the request. However, these managers did not conduct a formal evaluation such as cost-benefit or market analyses to support their decision to continue the project. The project was subsequently assigned to a new industry partner in September 2005, and has been on hold since the request for termination. During this time, the Department continued to provide funding including $100,000 to prepare, package, and ship the equipment to the new industry partner. In 2006, the Office decided to discontinue funding since the scope was no longer in line with revised Partnership goals.

Federal project managers continued another project, even after one Partnership participant decided to withdraw from the project based on shifts in the market demand and the inability to make the product at a competitive cost. The project, awarded in May 2002, with a Department cost share of approximately $1.2 million, was to develop a Magnetic Resonance Imaging, or "MRI" system. Even though the project's research had been completed, the Department authorized the industry partner to use the estimated remaining $349,000 to pursue another market area for the project. The Federal project managers did not conduct formal cost or market analyses before deciding to continue funding the project. Moreover, subsequent efforts to apply the technology to the new market area have not been completed.

Program Oversight

The Office had not developed an effective strategy to manage the financial assistance of its Partnership cooperative agreements. Specifically, the Office had not developed policies and procedures to ensure that Federal project managers:

- Identify and mitigate financial risk for cooperative agreements. For example, the Office did not require Federal project managers to analyze and document their decision to provide funding for the cable system design when the project specifications depended on the characteristics of a site that had not yet been obtained. Such a requirement may have limited the amount of funds spent on a design that subsequently had to be redone because a different site was eventually secured.

- Ensure that each cooperative agreement clearly delineated the substantial involvement anticipated between the Department and the industry partners. For example, the Office allowed the Federal project managers to enter into cooperative agreements that did not specify that the Department could review and approve the completion of one phase of work prior to initiating work on subsequent phases. This increased the financial risk to the Department.

- Conducted formal evaluations of the viability of continuing projects when industry partners requested termination or believed the markets no longer supported the continued financial investment. Although our review showed that decisions to continue projects were discussed, it was clear that the managers had not conducted and documented formal evaluations, including cost and/or market analyses, to support their decisions.

Effective Use of Funding

Overall, approximately $5 million was spent to redesign a project and for other unnecessary costs that could have been better used by the Department. Also, the Department may be exposed to further financial risk since the Office plans to spend an additional $2 million to $3 million to demonstrate a technology for which the R&D has not been successfully completed.

Improvement in the management of Partnership projects is especially important given that the Department announced a financial assistance funding opportunity for superconducting power equipment in August 2006. The Department anticipates that its share of funding for any one award will be between $20 million to $30 million of the total allowable project costs. To their credit, Office program officials stated that they plan to improve the management of financial assistance for future Partnership projects.

In July 2006, the Department revised its Guide to Financial Assistance, outlining, among other things, basic principles of program and project management that can be applied to cooperative agreements.

RECOMMENDATIONS

Consistent with the Department's guidance and sound business practices, we recommend the Director, Office of Electricity Delivery and Energy Reliability, ensure that policies and procedures relating to the management of financial assistance for the Partnership projects are developed and implemented that require Federal project managers to:

1. Prepare a financial risk mitigation plan at the time of project award and periodically update thereafter, which includes: (i) completing a risk analysis to identify key impediments to successful project completion; and, (ii) designing and executing mitigating procedures to address the identified impediments;

2. Ensure that each cooperative agreement clearly delineates the substantial involvement anticipated between the Department and the industry partners; and,

3. Evaluate the viability of continuing projects when industry partners request termination of the project or believe the markets no longer support the continued financial investment, including documenting the results of the evaluation and steps taken to arrive at the Department's decision.

MANAGEMENT AND AUDITOR COMMENTS

Management concurred with each of the recommendations and agreed to take corrective actions. Specifically, Management agreed to: 1) complete a financial risk mitigation plan at the time of project award beginning with the Fiscal Year 2007 awards made under its next funding opportunity; 2) address international entities' participation in cooperative agreements and the financial risk associated with currency fluctuations; 3) define specific responsibilities that it and the recipient will have in regard to each cooperative agreement; and, 4) consider continuing projects only after industry partners submit a Continuation Application, which management must approve before projects advance into the next performance period. We consider management's proposed actions to be responsive to the recommendations. Management's verbatim comments are included in Appendix 3.

Appendix 1

OBJECTIVE

The objective of this audit was to determine whether the Office of Electricity Delivery and Energy Reliability (Office) has effectively managed its financial assistance of the Superconductivity Partnership (Partnership) projects.

SCOPE

The audit was performed between March and October 2006 at the Office, located in Washington, D.C., and with Federal project managements at the Golden Field Office (Golden), located in Golden, Colorado. The scope of this audit was limited to the 16 Partnership projects that were open as of July 2006.

METHODOLOGY

To accomplish the audit objective, we:

- Obtained and reviewed laws, regulations, policies, and procedures relevant to the Department of Energy's (Department) award and management of Partnership cooperative agreements;
- Reviewed results of prior audits and reviews;
- Held discussions with Office and Golden officials regarding the history of the Partnership projects; current status of the Partnership projects; and, monitoring/oversight procedures;
- Identified all the Partnership projects that had been awarded, and reviewed the status to determine those still open;
- Obtained and reviewed the cooperative agreement award files and other correspondence for the 16 open Partnership projects identified;
- Reviewed award decision documents; and,
- Discussed the results of the work performed with Office and Golden officials.

The audit was performed in accordance with generally accepted Government auditing standards for performance audits and included tests of internal controls and compliance with laws and regulations to the extent necessary to satisfy the audit objective. Specifically, we tested controls with respect to the Department managing financial assistance of the Partnership projects. Because

our review was limited, it would not necessarily have disclosed all internal control deficiencies that may have existed at the time of our audit. Also, we considered the establishment of performance measures in accordance with the *Government Performance and Results Act of 1993* as they related to the audit objective. Specific performance measures concerning the management of financial assistance did not exist. We relied on computer-processed data to accomplish our audit objective. We performed test work of data reliability that was necessary to meet our audit objective.

Management waived an exit conference on January 10, 2007.

RELATED AUDIT REPORTS

- *Selected Energy Efficiency and Renewable Energy Projects* (DOE/IG-0689, May 2005). This audit found that the Department of Energy's (Department) Energy Efficiency and Renewable Energy project officials were not always sufficiently involved in managing projects funded by cooperative agreements with commercial organizations. Specifically, in some cases, the current Federal project officials had not reviewed the project files and had no knowledge of the status of a project or whether needed reviews and visits had been performed. In addition, two of the projects reviewed suffered from significant management problems and were not going to meet their objectives. Energy Efficiency and Renewable Energy also did not have a system to identify high-risk projects which would have allowed project officials to focus their attention on those agreements with weaknesses rather than all agreements under their purview. Per the Department's Guide to Financial Assistance, Federal project officials should quickly identify high-risk projects and become substantially involved in their management and performance and in so doing, project officials can take steps to better monitor financial and business information on problem projects.

- *The McNeil Biomass Project* (DOE/IG-0630, December 2003). The Department continued to provide funds to the McNeil Biomass Project (Project) even though there was little or no progress toward meeting its Fiscal Year 2002 objectives. Progress reports frequently indicated that milestones were not achieved or no activities were conducted and the program officials continued to authorize reimbursements for expenditures. Similarly, funding was not interrupted even after the recipient notified the Department that it would not be possible to complete scheduled tests because of various delays. Program officials did not devote adequate attention to establishing project objectives and did not closely monitor the Project. In addition, no action was taken to modify milestones or alter funding plans even after the recipient made it clear that it was not possible to complete scheduled tests because of various delays.

- *Financial Assistance for Biomass-To-Ethanol Projects* (DOE/IG-0513, July 2001). The Department's Office of Fuels Development (OFD) did not implement risk mitigation measures despite signs of risk. Specifically, OFD made an award to a company without assurance that a needed financing package would be available. Also, tight constraints were not placed on funding when the decision was made for the Department to have a high cost share percentage. In addition, funding was not terminated when it became apparent that the key first phase deliverables of the project would not be met. Rather, the Department decided to modify the scope of the project to delete the second phase and continued funding the original phase. Additionally, OFD did not withhold, suspend, or terminate funding to a company when it became apparent that it would not fulfill the terms of the financial assistance awards. Specifically, OFD continued to fund it after it reached its original funding ceiling.

Department of Energy
Washington, DC 20585

December 21, 2006

MEMORANDUM FOR: GEORGE W. COLLARD
ASSISTANT INSPECTOR GENERAL
PERFORMANCE AUDITS
OFFICE OF INSPECTOR GENERAL

FROM: KEVIN M. KOLEVAR
DIRECTOR
OFFICE OF ELECTRICITY DELIVERY
AND ENERGY RELIABILITY

SUBJECT: Response to IG Draft Report on "Management Controls over the Department of Energy's Superconductivity Partnerships"

We have reviewed the draft report entitled and agree with its conclusions and observations. In response to the recommendations, OE plans to take the following actions:

Recommendation 1:
Prepare a financial risk mitigation plan at the time of project award and periodically update thereafter, which includes: (i) completing a risk analysis to identify key impediments to successful project completion; and, (ii) designing and executing mitigating procedures to address the identified impediments.

OE Action Planned:
OE will complete a financial risk mitigation plan at the time of project award and periodically updated thereafter. OE will initiate this with FY 2007 awards made under Funding Opportunity Announcement (FOA) DE-PS26-06NT42874, "Superconducting Power Equipment."

The project manager (at DOE's National Energy Technology Laboratory – NETL), and the applicant's project team, will identify financial risks and will prepare a financial risk mitigation plan. NETL will conduct an initial financial risk assessment as part of the application evaluation. These financial risks, as well as any others that may be identified subsequently during discussions with the applicant, will be analyzed for their probability and potential impact. NETL will require that the Participant's Project Management Plan include a task (early in Budget Period 1) to develop and implement a risk mitigation plan appropriate for the project. The plan will include formal updates at each go/no go decision step in the project.

In addition, a DOE financial analyst will review the Participant's financial management system as part of the negotiation process to ensure it meets the standards of 10CFR600. Also, OE will consider Participant qualifications based on the financial review, review of audits, review of Dunn & Bradstreet reports, review of certifications and assurances, and other past performance.

For applications that involve participation of international entities, NETL will require the applicant to include in their financial risk mitigation plan the steps (e.g. purchase of insurance) they will take to protect against the risks of currency fluctuations. For financial assistance awards, it is the applicant's responsibility to guarantee that their share of the total project cost will be available. Funds from OE are limited to those currently obligated as shown on the face of the agreement. However, subject to the limitations of FAR 31.205-19 *Insurance and indemnification*, OE could authorize (as an allowable cost) premiums for risk insurance.

Recommendation 2
Ensure that each cooperative agreement clearly delineates the substantial involvement anticipated between the Department and the industry partners; and,

OE Action Planned:
Each cooperative agreement will clearly delineate the substantial involvement anticipated between the government and the industry partners. OE will adhere to the following procedures, based primarily upon the FOA VI.B *ADMINISTRATIVE AND NATIONAL POLICY REQUIREMENTS*:

RECIPIENT'S RESPONSIBILITIES. The Recipient is responsible for the following:

- *Perform the activities supported by this award, including providing the required personnel, facilities, equipment, supplies and services;*
- *Define approaches and plans and submitting them to OE for review and comment if requested by OE;*
- *Manage and conduct the project activities;*
- *Report at least quarterly (four times per year) on project cost, schedule and performance.*
- *Alert OE management immediately of any substantial change which will seriously disrupt or prevent the completion of the project.*
- *Attend program review meetings and reporting project status;*
- *Submit technical reports and incorporate OE comments; and;*
- *Present the project results at appropriate technical conferences or meetings.*

OE RESPONSIBILITIES. OE is responsible for, and will strictly adhere to, the following:

- *Review project plans in a timely manner, including technology transfer plans, and recommend redirecting the work effort if the plans do not address critical programmatic issues;*

- *Recommend direction or redirection of the work based upon its interrelationship with other projects;*
- *Conduct annual program review meetings to ensure adequate progress and that the work accomplishes the program and project objectives. Recommend alternate approaches to the work or shifting work emphasis, if needed;*
- *Promote and facilitate technology transfer activities, including disseminating program results through presentations and publications; and*
- *Serve as scientific/technical liaison between awardees and other program or industry staff.*
- *Serve as the technical liaison between the Recipient and the Federally Funded Research and Development Centers (FFRDC) through the DOE Field Work Proposal System*

Recommendation 3
Evaluate the viability of continuing projects when industry partners request termination of the project or believe the markets no longer support the continued financial investment, including documenting the results of the evaluation and steps taken to arrive at the Departments' decision.

OE Action Planned:
OE will continue projects only after industry partners submit a Continuation Application which OE must approve before projects advance into the next performance period The FOA requires that the applicant divide the total project period of performance into budget periods for funding purposes.

At the end of each budget period, the successful applicant (participant) will prepare a Continuation Application, which OE will evaluate to assess technical and financial performance, ability to meet cost, schedule and performance milestones, compliance with reporting requirements, and provision for cost share.

If the participant does not wish to continue into the next Budget Period, the participant will not submit a Continuation Application. If the participant wishes to terminate the project during a Budget Period, OE will deliberate on project conclusion under 10CFR600.25 (d) *Termination by mutual agreement.*

If should have any questions please contact Patricia Hoffman at 202-586-6074.

IG Report No. OAS-M-07-01

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