OFFICE OF INSPECTOR GENERAL

U.S. Department of Energy

AUDIT REPORT

OAI-M-17-01 October 2016

FOLLOWUP ON THE GEOTHERMAL TECHNOLOGIES OFFICE

Department of Energy
Washington, DC 20585

October 18, 2016

MEMORANDUM FOR THE ACTING DIRECTOR, GEOTHERMAL TECHNOLOGIES OFFICE

FROM: Sarah B. Nelson
Assistant Inspector General
for Audits and Administration
Office of Inspector General

SUBJECT: INFORMATION: Audit Report for the "Followup on the Geothermal Technologies Office"

BACKGROUND

The Department of Energy's Geothermal Technologies Office (Geothermal) accelerates the deployment of clean, domestic geothermal energy by supporting innovative technologies that reduce the cost and risks of deployment. Formerly known as the Geothermal Technologies Program, Geothermal invests in research and development of innovative technologies and facilities' demonstrations through the issuance of grants and cooperative agreements. Since 2009, Geothermal has awarded approximately $368 million in *American Recovery and Reinvestment Act of 2009* funds, as well as over $297 million in regular appropriations to private industry, national laboratories, local governments, universities, and other entities.

Our report on *The Department of Energy's Geothermal Technologies Program under the American Recovery and Reinvestment Act* (OAS-RA-11-05, March 2011) identified weaknesses in project administration, including insufficient monitoring of awards. The Department concurred with the findings and recommendations contained in the report and stated that it had implemented corrective actions to enhance the effectiveness of its oversight. Because of the issues identified in our previous report and the significant amount of appropriations awarded since 2009, we initiated this review to determine whether the Department had met its goals and objectives and had effectively and efficiently managed Geothermal financial assistance awards.

RESULTS OF AUDIT

Nothing material came to our attention to indicate that Geothermal's management of its financial assistance awards was not generally effective. However, our review found that Geothermal had not always obtained deliverables required of recipients in financial assistance award terms and conditions. In particular, three of the four recipients included in our review had not submitted either a final report or technical data in accordance with the terms and conditions of their awards. These issues occurred because Geothermal had not always managed the receipt of its recipients'

deliverables. Specifically, Geothermal had not always implemented existing procedures that had been put in place to ensure final deliverables were submitted by awardees. Additionally, Geothermal lacked formal policies and procedures detailing the types of data to be submitted into the Geothermal Data Repository (Repository). Geothermal established the Repository to receive, manage, and make available all geothermal-relevant data generated from its projects. This included data from projects associated with any portion of the geothermal project life cycle (exploration, development, operation), as well as data produced by Geothermal-funded research.

In line with the Department's strategic objectives on information sharing, Geothermal has developed initiatives to facilitate public outreach and data sharing within the scientific community. Given the nature of research and development activities, obtaining final project deliverables and technical reports is critical in supporting this initiative. In an effort to achieve this initiative, Geothermal developed the Repository to collect and submit data through the course of an award. This data is to be made publicly available as an industry resource in further developing geothermal technologies. By not ensuring the receipt and sharing of technical information from final deliverables and ongoing research data submissions, the Department cannot demonstrate performance has been achieved as expected, or if progress is being made in meeting Geothermal's objectives and goals of accelerating the deployment of clean domestic geothermal energy.

On a positive note, we found that Geothermal had implemented corrective actions to address the recommendations made in our March 2011 report. These corrective actions included reviewing costs we had questioned and making a determination on allowability, as well as providing additional training and guidance to program officials and recipients on implementation of *Davis-Bacon Act* requirements to ensure laborers are compensated in accordance with prevailing wage rates for the geographic area where they work. Further, the Department shifted internal resources and added additional full-time positions to enhance oversight and management of Geothermal projects.

Timely Deliverable Submissions

We found instances where recipients had not submitted a final report to the Department or technical data into the Repository in accordance with the terms and conditions of their awards. Recipients are required to provide information summarizing technical and financial performance through the course of, and upon conclusion of, each award. Specifically, we found that three of the four recipients included in our audit had not submitted a final technical report to the Department or technical data into the Repository within required timeframes. In particular:

- Schlumberger Technology Corporation (Schlumberger) was more than 2 years late in submitting its final technical report for a grant to develop a high temperature perforating system for geothermal applications. The technical report, due in December 2013, had not yet been submitted. Additionally, while Schlumberger had completed a design and most of the component testing during its award period, it had submitted no technical data into the Repository. Schlumberger's grant, awarded in December 2009, was amended in June 2012 to add the requirement to report data to the Repository.

- Geotek Energy LLC (Geotek) had not submitted any technical data into the Repository for its efforts in addressing inefficiencies of downhole expander pumping units. Geotek's cooperative agreement, awarded in September 2011, was modified in July 2013 to add the requirement to submit data to the Repository. Geotek's efforts included conducting studies, collecting data, and completing analyses during the first phase of its project. In March 2015, a decision was made to terminate the project and in July 2015, funds were subsequently deobligated.

- Paulsson Inc. (Paulsson), after completing the first phase of its project in March 2013 and entering into the second phase, had not submitted any data into the Repository on its ongoing grant to design, build, and test a new borehole seismic receiver system for geothermal reservoir wells. Paulsson's grant, awarded in September 2011, was amended in February 2012 to add the requirement to submit data to the Repository. Program officials indicated that reminders have been sent to Paulsson through the quarterly assessments and it is expected that data will be submitted once field work has been completed.

Final technical reports are required within 90 calendar days after the period of performance end date (or the expiration or termination of the award). Awardees are required to provide data to the Repository as it is generated, but no later than the end of each reporting quarter in which the data is generated. Geothermal acknowledged a problem exists with obtaining final reports from recipients. To counteract this issue, officials stated that initiatives, which included the hiring of additional staff, have been implemented to actively work to obtain deliverables during the closeout process.

In its May 2011 Strategic Plan, the Department stated that its success would be measured not when a project is completed or an experiment concluded, but when scientific and technical information is disseminated. Final technical reports are crucial documents that provide an executive summary of the results of the award and the technology used and/or tested. Investments in research and development create a knowledge base of potentially transformative ideas that are critical building blocks of innovation. Sharing this knowledge through final technical reports and data adds to the industry's understanding of the technical and economic benefits to the public.

Delinquent deliverables have been a recurring issue that has been identified in a number of Office of Inspector General reports. For example, in our report *Public Dissemination of Research Results* (DOE/IG-0912, May 2014), weaknesses were identified in the Department's ability to monitor receipt of final reports from recipients. Also, in our report *Atmospheric Radiation Measurement Climate Research Facility* (OAI-M-16-10, May 2016), we noted that final technical reports and climate data sets had not always been obtained from all recipients, as required by their financial assistance agreements. Finally, our report *Inspection of Savannah River Operations Office Management of Emergency Response and Law Enforcement-Related Grants* (DOE/IG-0604, June 2003) concluded that Savannah River had not received and/or followed up on delinquent deliverables for its grant recipients. These examples illustrate the Department's continued difficulties in obtaining deliverables from its recipients.

Management of Deliverables

These issues occurred because Geothermal had not always managed the receipt of its recipients' deliverables in a consistent manner. Specifically, Geothermal had not always implemented existing procedures that had been put in place to ensure final deliverables were submitted to the Department by awardees. Additionally, Geothermal lacked formal policies and procedures detailing the types of data to be submitted into the Repository for the awards we examined.

The existing procedure for managing delinquent final deliverables includes three steps, or notices, taken by Geothermal to inform awardees that they are not in compliance regarding final deliverable submissions to the Department. An initial email is sent to the awardee immediately after the period of performance end date reminding the awardee of the deliverables requirement, which includes a listing of deliverables that must be submitted within 90 days. If deliverables are not submitted within the 90-day timeframe, a first notification of non-compliance is sent by the Department to the awardee requesting the deliverables or a written explanation of why the deliverables have not been received. If a response has not been received within 30 days, a second notification of non-compliance is sent to the awardee, again requesting the deliverables or a written explanation within 30 days. The third and final notice, 151 days after the period of performance end date, includes a formal written notice of non-compliance signed by the contracting officer. Each of the non-compliance notices described above includes language stating if an awardee does not comply, the Department may withhold payments due and/or take into consideration the non-responsiveness for future awards and/or initiate a Government-wide debarment action.

The non-submission of Schlumberger's final technical report occurred because Geothermal had not implemented these available steps or notices. Geothermal officials were unable to locate any non-compliance notices that had been sent to Schlumberger. Additionally, the program manager for the award stated that because they were unable to locate the notices, he could not be certain whether any had been sent to the awardee. Further, the program manager indicated the last formal communication with Schlumberger had been in November 2013, requesting a closeout of the award. Since that time, according to Geothermal officials, additional delays in obtaining the final technical report have been attributed to a backlog and increased workload related to closing out the award.

The lack of submitted research data into the Repository occurred because Geothermal did not have formal policies and procedures in place detailing the types of data to be submitted into the Repository for the awards we examined. While language had been added to the terms and conditions of these awards requiring data submission into the Repository, there was no clear consensus among Geothermal officials as to the types of data that should be submitted. Officials' descriptions of the data submission process differed depending on the award. Specifically, these descriptions ranged from requiring submission of only raw data collected throughout the award to requiring more formal data contained within technical reports, which, according to officials, represented the most crucial source of information and assisted the program in achieving its goals to accelerate deployment of clean domestic geothermal energy. This disparity of opinions and/or understanding of the types of data to be submitted between program officials compounded the lack of a documented process. Subsequently, Geothermal

officials stated that applicants applying to Funding Opportunity Announcements after October 1, 2012, were required to submit a Data Management Plan outlining the content, format, and time expectation of data to be submitted into the Repository for each task in the project's Statement of Project Objectives. While the Data Management Plan provides information on the timing and expectation of data to be submitted, this practice was not in place for the projects we examined. Additionally, officials stated the recipients are responsible for outlining the data expectations. However, management did not provide us with any information, and we were unable to conclude whether a formal mechanism exists to ensure data is submitted as required. Further, management attributed the non-submission of data into the Repository for the Geotek award to the nature of the work, design and engineering, conducted by the recipient. However, the Repository's site stated all geothermal-relevant data developed across "any portion of the project life cycle," including data developed during exploration and development, should be submitted.

Finally, we were unable to determine how systemic the issue of delinquent deliverables was because the program was unable to provide us reliable information on the number of awards with delinquent deliverables. Officials stated that they generate reports on an as-needed basis to provide project officers/monitors with a consolidated list of delinquent submissions. However, these types of reports were not evident during our review of program documentation, and when requested, program officials were not readily able to provide the report. Instead, a delinquency report had to be developed based specifically on our request. However, upon receipt of the delinquency report, we noted anomalies in the report that rendered it unreliable.

Impact and Path Forward

Without the technical information from crucial final deliverables and research data submissions, the Department cannot fully demonstrate performance has been achieved as expected, or if Geothermal objectives and goals have been met. Further, valuable research and development supported with Federal funding is not being made publicly available to maximize the leveraging of Department investments. As a result, taxpayer dollars may be wasted in the future to unknowingly duplicate research and development.

RECOMMENDATIONS

To ensure the Geothermal goals and objectives are met, we recommend the Acting Director of the Geothermal Technologies Office:

1. Reinforce the implementation of existing procedures to ensure the timely submission of required deliverables;

2. Develop a formal mechanism to ensure recipient data submission requirements documented in the Data Management Plans are being met as expected; and

3. Review projects currently in the closeout process to ensure sufficient followup has occurred to obtain final deliverables and required data has been submitted into the Repository as required.

MANAGEMENT RESPONSE

Management generally concurred with the recommendations and indicated that corrective actions had either been completed or were planned to address the issues identified in the report. For Recommendation 2, while management agreed that a formal mechanism was needed and had already been developed to ensure data was submitted as expected, it pointed out that the financial assistance agreements highlighted in our report pre-dated those requirements.

AUDITOR COMMENTS

We consider management's comments and corrective actions, taken and planned, to be responsive to our findings and recommendations. Although we acknowledge management's assertion that the awards in our sample pre-dated the Repository, we found that upon implementation of the Repository, modifications to the awards were made to include data submission requirements to the Repository.

Management's comments are included in Attachment 3.

Attachments

cc: Deputy Secretary
Under Secretary for Science and Energy
Chief of Staff

OBJECTIVE, SCOPE, AND METHODOLOGY

OBJECTIVE

The objective of this audit was to determine whether the Department of Energy had met the goals and objectives of the Geothermal Technologies Office (Geothermal) and had effectively and efficiently managed the financial assistance awards.

SCOPE

The audit was performed between May 2015 and October 2016. The scope of the audit was limited to all awards made from fiscal years 2009 to 2015. We conducted work at the Geothermal office located at the Department's Headquarters in Washington, DC. We conducted this audit under the Office of Inspector General project number A15PT033.

METHODOLOGY

To accomplish the audit objective, we:

- Reviewed applicable laws, regulations, and program guidance applicable to Geothermal.

- Interviewed key Department officials to discuss their responsibilities related to the management and oversight of Geothermal activities, including review and approval of cost reimbursement requests.

- Reviewed the Department's responses to the findings made in our prior report *The Department of Energy's Geothermal Technologies Program under the American Recovery and Reinvestment Act* (OAS-RA-11-05, March 2011) to confirm Geothermal had taken actions to address each recommendation.

- Selected and reviewed four Geothermal awards, representing approximately $32 million in Government funding through regular appropriations and funding from the *American Recovery and Reinvestment Act of 2009* (Recovery Act). Between fiscal years 2009 and 2015, Geothermal awarded over $665 million, including approximately $368 million in Recovery Act funds, to over 250 projects. We judgmentally selected our sample based on factors that included Departmental funding, congressionally directed projects, Recovery Act funding, and project start dates. Our testing included an analysis of the official records stored in the Strategic Integrated Procurement Enterprise System, data and deliverable submissions, site visit documentation, and peer review scores. Because we did not use a statistical sample, we could not project our results to the population.

We conducted this performance audit in accordance with generally accepted Government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives. The audit included tests of controls

and compliance with laws and regulations to the extent necessary to satisfy the audit objective. We considered the *GPRA Modernization Act of 2010* as necessary to accomplish the objective, and determined that quantifiable metrics had been developed in accordance with the Act and was applicable to our audit scope. Because our review was limited, it would not have necessarily disclosed all internal control deficiencies that may have existed at the time of our audit. We conducted a limited reliability assessment of computer-processed data which included comparing the data to source documents for accuracy and we deemed the data to be sufficiently reliable for the purpose of selecting our sample.

Department officials waived an exit conference on October 6, 2016.

PRIOR REPORTS

- Audit Report on *Atmospheric Radiation Measurement Climate Research Facility* (OAI-M-16-10, May 2016). This review found that the Atmospheric Radiation Measurement Climate Research (ARM) Facility did not always obtain climate data sets from external users for inclusion in the ARM Data Archive. Moreover, final technical reports of the external projects were not always obtained, and when reports were acquired, they were not always shared with other researchers and the public through the Department's Office of Scientific and Technical Information system. These issues occurred because the ARM Facility's policy and procedures did not go far enough to secure data and final reports from external users. Furthermore, there were no negative consequences for not submitting data or final reports. In addition, ARM personnel did not follow existing submission procedures to transfer reports into the Office of Scientific and Technical Information system.

- Audit Report on *Public Dissemination of Research Results* (DOE/IG-0912, May 2014). The review revealed that Department-funded science and energy research results were not always properly disseminated to the public. The audit found that financial assistance recipients had not always submitted final technical reports to the responsible office, unrestricted reports submitted to the Department's Energy Link system were not always reviewed and subsequently released publicly, and reports were not released after the expiration of associated data protection periods. These issues occurred due to weaknesses in the Department's processes for monitoring receipt of final reports from recipients, reviewing and releasing reports that have been received, addressing processing errors that prevent receipt or release of reports, and identifying and releasing reports upon expiration of data protection periods.

- Audit Report on *The Department of Energy's Geothermal Technologies Program under the American Recovery and Reinvestment Act* (OAS-RA-11-05, March 2011). This review found that, in general, the Department followed established procedures for the solicitation, merit review, selection, and award of geothermal projects. However, the report identified weaknesses in project administration that needed to be addressed to ensure that the Government's interests were protected, that financial assistance recipients fully comply with Federal requirements, and that the goals of the *American Recovery and Reinvestment Act of 2009* would be met. In particular, the review found that five of the for-profit award recipients reviewed had been paid in excess of $110,000 for items that were either expressly unallowable or were questionable under Federal regulations and award conditions. In addition, the report found that five of the six award recipients reviewed had not required subcontractors to implement *Davis-Bacon Act* requirements to pay prevailing wage rates as mandated by the *American Recovery and Reinvestment Act of 2009*. The report concluded that these issues occurred because the Department had not developed and implemented procedures for monitoring projects, assigned adequate staff to monitoring activities, or adequately trained recipients on Federal rules regarding unallowable costs. The report also noted that award recipients indicated that they were uncertain about how to apply *Davis-Bacon Act* requirements.

- Inspection Report on *Inspection of Savannah River Operations Office Management of Emergency Response and Law Enforcement-Related Grants* (DOE/IG-0604, June 2003). This inspection found that the Department's Savannah River Office had not adequately managed its grants to Georgia and South Carolina. Specifically, Savannah River Office did not have documentation to support whether grant recipients were on schedule and meeting milestones. Further, Savannah River Office had not received many of the grants' deliverables, had not followed up on those delinquent deliverables as required, and lacked a formal system for tracking grant deliverables. These issues occurred because Savannah River Office did not have a formal system in place to track the status of required deliverables, to include having procedures for notifying a grantee when a deliverable was delinquent.

MANAGEMENT COMMENTS

Department of Energy
Washington, DC 20585

September 6, 2016

MEMORANDUM FOR: SARAH B. NELSON
ASSISTANT INSPECTOR GENERAL
FOR AUDITS AND ADMINISTRATION
OFFICE OF INSPECTOR GENERAL

FROM: ROLAND RISSER
DEPUTY ASSISTANT SECRETARY
FOR RENEWABLE POWER
OFFICE OF ENERGY EFFICIENCY AND
RENEWABLE ENERGY

SUBJECT: Response to Office of Inspector General Draft Audit Report "Follow-up on the Geothermal Technologies Office"

The Office of Energy Efficiency and Renewable Energy (EERE) appreciates the opportunity to review the Office of Inspector General's (OIG) August 2016 draft audit report entitled, "Follow-up on the Geothermal Technologies Office".

Aside from a few inaccuracies (See Appendix A), EERE concurs with recommendations one and three, and partially concurs with recommendation two, as identified in the report. Specific responses to your recommendations are provided below.

OIG Recommendation 1: Reinforce the implementation of existing procedures to ensure the timely submission of required deliverables.

EERE Response: EERE concurs with this recommendation and will reinforce the following existing procedures to ensure timely submission of required deliverables:

- The Geothermal Technologies Office (GTO) has implemented a practice of performing a budget evaluation at Go/No-Go decision points, whereby a review is completed to ensure the recipient is current on all deliverable requirements before allowing them to proceed to subsequent budget periods.

- Beginning in Q3 of FY16, GTO implemented the distribution to project officers of Delinquent Deliverable Reports. This tool provides project officers with a consolidated list of delinquent deliverables which they need to follow up on. GTO will continue this practice on a quarterly basis.

- Recipients of active projects will continue to receive automated upcoming deliverable, delinquent deliverable, and non-compliance notifications in accordance with the notification schedule.

- Beginning in 2014 as part of EERE's new requirements for active project management, GTO began completing quarterly assessments of applicable projects' quarterly progress reports. These reports, which are shared with recipients, track delinquent deliverables as well as delinquent data submissions. GTO project officers then work with recipients to resolve any delinquencies.

- In addition to the measures that have been described above and that were already implemented, GTO intends to develop and conduct training to reinforce these procedures consistently across applicable awards.

Estimated Completion Date: December 2016

OIG Recommendation 2: Develop a formal mechanism to ensure recipient Data Management Plans (DMP) are aligned with data submission requirements of the Repository and that data is being submitted as expected.

EERE Response: EERE partially concurs with this recommendation. In general, EERE concurs that a formal mechanism should be developed to ensure recipient DMPs are aligned with data submission requirements of the Repository and that data is being submitted as expected. Sample projects reviewed in this audit, however, pre-date deployment of the Repository, and a formal mechanism was not implemented for those awards. A formal process has since been implemented.

As of March 2012, when the Repository began accepting data, the procedures and detailed steps for data submission have been provided in official GTO award documents as on the Repository site. These procedures and data submission steps are detailed and updated regularly. Furthermore, during award negotiations, DMPs are reviewed to ensure that recipient project Statements of Project Objectives (SOPOs) carry forth the requirements outlined in the DMPs. GTO will continue to enforce this mechanism.

Estimated Completion Date: Completed March 2012

OIG Recommendation 3: Review projects currently in the closeout process to ensure sufficient follow-up has occurred to obtain final deliverables and required data has been submitted into the Geothermal Data Repository, as required.

EERE Response: EERE concurs with this recommendation. In addition to the actions listed for collection of deliverables under Recommendation 1, the below actions have been implemented to ensure collection of final deliverables and data requirements.

- Beginning in December 2015, a team of Closeout Coordinators was formed to assist GTO in financial assistance award closeout. Specifically, the coordinators:
  - Assist Geothermal in obtaining all required deliverables;
  - Provide expert guidance on the closeout process and requirements to federal project team and recipients, as needed;
  - Correspond with federal project team and recipients (as directed) to ensure accuracy of documentation;
  - Coordinate collection of final deliverables and track status through the approval process; and
  - Initiate closeout award modification.

- In April 2016, EERE released easy-to-follow guidance on the closeout process in the form of a PowerPoint presentation that is provided to each applicable recipient two months prior to the end

date of an award. This guidance provides a thorough review of all of the steps required to move the award through closeout and focuses on the exact deliverables due 90 days after the project end date. The guidance also helps to set expectations early regarding what deliverables are due with closeout, when they are due, and how to fill them out. This proactive approach to closeout is already being used for projects currently in the closeout process, and is intended to result in fewer delinquent or missing final deliverables. Additionally, by October 2016, GTO will look to customize this presentation in order to also reiterate Repository requirements and outstanding submission gaps.

- In 2015, in support of reviewing required data from recipients prior to submission into the Repository, GTO stood up Technical Monitoring Teams (TMT) composed of National Laboratory experts. The TMT:
    - Supports the review of new Data Management Plans in order to ensure relevance with the associated scope of work;
    - Reviews quarterly progress reports and participates in regularly scheduled TMT meetings in order to identify data gaps to be addressed by recipients;
    - Provides assistance with data submissions into the Repository to recipients and GTO staff; and
    - Reviews recipient data submissions for accuracy and relevance.

Estimated Completion Date: October 2016

FEEDBACK

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Office of Inspector General (IG-12)
Department of Energy
Washington, DC 20585

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