U.S. Department of Energy
Office of Inspector General
Office of Audits and Inspections

Inspection Report

Follow-up Inspection on Characterization Wells at Los Alamos National Laboratory

INS-L-13-05 July 2013

Department of Energy
Washington, DC 20585

July 9, 2013

MEMORANDUM FOR THE ACTING MANAGER, LOS ALAMOS FIELD OFFICE,
NATIONAL NUCLEAR SECURITY ADMINISTRATION

FROM: Sandra D. Bruce
Assistant Inspector General
for Inspections
Office of Inspector General

SUBJECT: INFORMATION: Inspection Report on "Follow-up Inspection on Characterization Wells at Los Alamos National Laboratory"

BACKGROUND

Since the early 1940s, the Los Alamos National Laboratory (Los Alamos) has conducted experimental research on the development of nuclear weapons and explosive materials. These activities have resulted in the generation and disposal of a variety of hazardous, radioactive, and solid wastes. Los Alamos has disposed of these wastes in septic systems, pits, surface impoundments, trenches, shafts, landfills, and waste piles at the facility. Contaminants such as plutonium, americium, and tritium have been detected in soils and sediments at the facility and in groundwater beneath the facility. In 1998, Los Alamos developed a workplan that established the basis for characterizing the hydrogeologic system beneath the facility and determining whether the concentration of contaminants in groundwater exceeded regulatory limits. Implementation of the workplan required the installation of 32 regional aquifer wells, commonly referred to as characterization wells.

In our September 2005 report on *Characterization Wells at Los Alamos National Laboratory* (DOE/IG-0703), we noted that the use of mud rotary drilling methods during well construction was contrary to specific constraints established in *Resource Conservation and Recovery Act* guidance. We also noted that muds and other drilling fluids that remained in certain wells after construction created a chemical environment that could mask the presence of radionuclide contamination and compromise the reliability of groundwater contamination data.

Considering the results of our prior inspection, we initiated this review to determine if Los Alamos had taken action to improve its characterization well process.

RESULTS OF INSPECTION

Our inspection found that Los Alamos had taken action designed to improve the management of its characterization well program. Specifically, we noted that Los Alamos no longer uses mud rotary drilling methods during well construction, and appropriate steps have been taken to ensure

data derived from monitoring wells is reliable. We also found that responsibility for the Los Alamos Characterization Wells Monitoring Program had been transferred to the New Mexico Environmental Department.

Mud Rotary Drilling

We found that Los Alamos no longer uses mud rotary drilling methods during well construction. At the time of our 2005 report, consideration was being given to converting some or all of the Los Alamos characterization wells to groundwater monitoring wells under a March 1, 2005, *Compliance Order on Consent* entered into by the New Mexico Environmental Department, the Department of Energy (Department), and the University of California (the prior Management and Operating Contractor).[1] However, in 2005, we reported that certain residual drilling fluids were not fully removed. Specifically, in the case of several of the wells constructed at that time, we reported that, contrary to *Resource Conservation and Recovery Act* guidance, certain wells were constructed without muds and other drilling fluids being totally purged. We also reported that muds and other drilling fluids that remained in the wells after construction created a chemical environment that could mask the presence of radionuclide contamination and compromise the reliability of groundwater contamination data.

During this follow-up inspection, we determined that corrective actions had been taken to address the issues with mud rotary drilling identified in our 2005 report. Specifically, the Los Alamos Field Office and New Mexico Environmental Department officials verified that the Hydrogeologic Workplan wells were converted to monitoring wells under the Compliance Order, and that in doing so, certain well screens[2] found to be unreliable were sealed off and no longer used for the collection of radionuclide data. Also, instead of using mud rotary drilling techniques, Los Alamos uses various air, potable water and foam techniques for the construction of monitoring wells under the Compliance Order. An example would be the use of foam approximately 100 feet above the aquifer and then the use of air and potable water from that point on. Finally, the New Mexico Environmental Department is now responsible for the Los Alamos Characterization Wells Monitoring Program and the requirements of that program as stated in the Compliance Order.

Contamination Data

We found that appropriate steps had been taken to ensure data derived from monitoring wells is more reliable. In 2005, we reported that the Department was voluntarily providing radionuclide contamination data to the State of New Mexico under a long-standing Department policy described in a 1998 agreement with the National Association of Attorneys General and a November 2000 Agreement-in-Principle between the Department and the State of New Mexico.

[1] This Order was issued pursuant to the New Mexico Hazardous Waste Act for the purpose of fully determining the nature and extent of releases of contaminants at or from Los Alamos and to identify, evaluate, and implement corrective measures to prevent or mitigate the migration of contaminants from the site. The requirements of the Order do not apply to radionuclides.

[2] A well screen serves as the intake point of a monitoring well. It permits water to enter the well from the aquifer for the purpose of collecting ground water samples. It also prevents geologic materials from entering the well and serves structurally to support unconsolidated materials that surround the well screen.

We also reported that the Department should provide any applicable qualifications on the accuracy and precision of that data.

During this follow-up inspection, we determined that concerns over the reliability of contamination data identified in our 2005 report were addressed by the changes in well drilling processes and the discontinued use of well screens that had been found to be unreliable. In addition, we noted during our inspection that the groundwater surveillance monitoring program follows well development and purging methods from the Compliance Order, which impact the quality of contamination data. Also, Los Alamos is now required to remove three well volumes of water prior to drawing samples. Further, Los Alamos and the New Mexico Environmental Department now perform separate tests using different samples analyzed at different laboratories and the reporting of radionuclide contamination data contains appropriate qualifications on the accuracy and precision of that data.

Because of the progress we observed, we are not making recommendations or suggestions. We appreciate the cooperation of your staff during our inspection.

Attachments

cc: Deputy Secretary
Acting Administrator, National Nuclear Security Administration
Chief of Staff

OBJECTIVE, SCOPE AND METHODOLOGY

OBJECTIVE

Considering the results of our prior inspection, we initiated this review to determine if Los Alamos National Laboratory had implemented the recommendations in our 2005 report that were intended to improve the characterization well process.

SCOPE

This follow-up inspection was conducted to verify that the recommendations of our inspection report, *Characterization Wells at Los Alamos National Laboratory* (DOE/IG-0703, September, 2005), were closed. This inspection was conducted from July 2012 to June 2013, at the National Nuclear Security Administration's Albuquerque Complex in Albuquerque, the New Mexico Environment Department in Santa Fe, and the Los Alamos National Laboratory in Los Alamos, New Mexico. To accomplish the inspection objective, we:

- Conducted research and analyses to include obtaining documentation showing evidence that recommendations were implemented;
- Reviewed Department Orders pertaining to the characterization well process;
- Conducted briefings and interviews with Characterization Wells and Monitoring Program officials and personnel from Los Alamos National Laboratory, the Los Alamos Field Office and New Mexico Environment Department; and
- Conducted an interview with the prior complainant related to our inspection report on *Characterization Wells at Los Alamos National Laboratory* (DOE/IG-0703, September, 2005).

METHODOLOGY

This inspection was conducted in accordance with the Council of the Inspectors General on Integrity and Efficiency's *Quality Standards for Inspection and Evaluation*, January 2012. Those standards require that we plan and perform the inspection to obtain sufficient, appropriate evidence to provide a reasonable basis for our conclusions and observations based on our inspection objective. We believe the evidence obtained provides a reasonable basis for our conclusions and observations based on our inspection objective. Accordingly, the inspection included tests of controls and compliance with laws and regulations to the extent necessary to satisfy the inspection objective. Because our review was limited, it would not necessarily have disclosed all internal control deficiencies that may have existed at the time of our inspection. Finally, we relied on computer-processed data, to some extent, to satisfy our objective. We confirmed the validity of such data, when appropriate, by reviewing source documents and conducting physical observations.

The exit conference was waived by National Nuclear Security Administration management.

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