



U.S. Department of Energy
Office of Inspector General
Office of Inspections and Special Inquiries

Inspection Report

Concerns Regarding Lead Contamination and Radiological Controls at the Nevada Test Site

INS-O-06-02

May 2006



Department of Energy

Washington, DC 20585

May 17, 2006

MEMORANDUM FOR THE MANAGER, NEVADA SITE OFFICE

FROM: *A. K. Walter*
Alfred K. Walter
Assistant Inspector General
for Inspections and Special Inquiries

SUBJECT: INFORMATION: Inspection Report on "Concerns Regarding Lead Contamination and Radiological Controls at the Nevada Test Site"

BACKGROUND

The mission of the Department of Energy's Nevada Test Site (NTS) includes experimental and hazardous work in support of the national Stockpile Stewardship Program; maintaining the capability to resume underground nuclear testing; performing characterization and remediation of legacy nuclear testing sites; and managing nuclear waste operations. In conjunction with these activities, materials such as lead and sealed radioactive sources are stored at NTS. Lead is a neurotoxic metallic element that can be absorbed by the body, primarily through the lungs and stomach, and can potentially cause lead poisoning. Sealed radioactive sources consist of radioactive material contained within a sealed capsule; in the current environment, they have the potential to be used to make "dirty bombs" (conventional bombs mixed with radioactive material).

The Office of Inspector General received an allegation that lead bricks at the site's Occupational Medicine facility (Building 650) created a lead dust hazard and that there were numerous specified radiological control violations at NTS. Therefore, the objectives of our inspection were to determine (1) whether there was a lead dust hazard at Building 650; and (2) if specified radiological control violations existed at NTS. Additionally, as a follow-up to a March 2002 Office of Inspector General report entitled "Inspection of the Accountability and Control of Sealed Radioactive Sources at Selected Department of Energy Sites," DOE/IG-0544, which included findings at NTS, we conducted a limited review of the management of the NTS sealed radioactive source program.

RESULTS OF INSPECTION

We concluded that the allegations were partially substantiated. Specifically, we found that:

- Surface lead dust contamination at four locations in Building 650 exceeded the site contractor's established threshold levels. Further, the contractor had not taken action to make surfaces in these contaminated areas "as free as practicable" of lead dust, as required by the Occupational Safety and Health Administration; and



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- A number of specified radiological control violations did exist; however, the site contractor had self-reported them and was in the process of verifying the completion of the corrective actions.

Regarding our follow-up review of the management of the NTS sealed radioactive source program, we concluded that the program had improved since our last inspection, but that there were areas that should be strengthened. For example, we found that the site contractor had not consistently implemented certain site radiological control program requirements for managing its sealed radioactive sources.

Based upon our findings, we recommended several corrective actions intended to enhance safety and health at NTS.

MANAGEMENT REACTION

In responding to a draft of our report, management was in general agreement with our recommendations and identified corrective actions that it is taking. Management's comments are provided in their entirety at Appendix B.

Attachment

cc: Chief of Staff
Assistant Secretary for Environment, Safety and Health
Director, Policy and Internal Controls Management (NA-66)
Director, Office of Internal Review (CF-1.2)
Audit Liaison, Nevada Site Office

CONCERNS REGARDING LEAD CONTAMINATION AND RADIOLOGICAL CONTROLS AT THE NEVADA TEST SITE

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Overview

INTRODUCTION AND OBJECTIVES

The Department of Energy's (DOE's) Nevada Test Site (NTS) mission includes experimental and hazardous work in support of the national Stockpile Stewardship Program; maintaining the capability to resume underground nuclear testing; performing characterization and remediation of legacy nuclear testing sites; and managing nuclear waste operations. NTS is operated for DOE by Bechtel Nevada and is under the cognizance of DOE's National Nuclear Security Administration (NNSA). In March 28, 2006, the Department announced that National Security Technologies, LLC had been awarded a contract to manage and operate NTS, replacing Bechtel Nevada as the site contractor. Full performance of the new contract is scheduled to begin in July 2006.

In conjunction with the above activities, materials such as lead and sealed radioactive sources are stored at NTS. Lead is a neurotoxic metallic element that can be absorbed by the body, primarily through the lungs and stomach, and can potentially cause lead poisoning. Left untreated, lead poisoning can damage internal organs, including the kidneys, nervous system, and brain. Sealed radioactive sources consist of radioactive material contained within a sealed capsule. Sealed radioactive sources are most commonly used throughout DOE for testing and calibration of radiation detection instrumentation. In the current environment, they have the potential to be used to make "dirty bombs" (conventional bombs mixed with radioactive material).

The Office of Inspector General received an allegation that lead bricks at the Occupational Medicine facility (Building 650) at NTS created a lead dust hazard and that there were numerous specified radiological control violations throughout NTS. Therefore, the objectives of our inspection were to determine whether:

- There was a lead dust hazard at Building 650 at NTS; and
- Specified radiological control violations existed at NTS.

Additionally, as a follow-up to a March 2002 Office of Inspector General report entitled "Inspection of the Accountability and Control of Sealed Radioactive Sources at Selected Department of Energy Sites," DOE/IG-0544, which included findings at NTS, we conducted a limited review of the management of the NTS sealed radioactive source program.

OBSERVATIONS AND CONCLUSIONS

We concluded that the allegations were partially substantiated. Specifically, we found that:

- Surface lead dust contamination in the basement of Building 650, as well as in a storage room known as the Detector Room and two offices above the basement, exceeded Bechtel Nevada's established threshold levels. Further, Bechtel Nevada had not taken action to make surfaces in these contaminated areas "as free as practicable" of lead dust, as required by the Occupational Safety and Health Administration (OSHA); and
- A number of specified radiological control violations did exist; however, Bechtel Nevada had self-reported them and was in the process of verifying the completion of the corrective actions identified in its associated corrective action implementation plan. We did not substantiate the remaining allegations concerning radiological control violations.

Regarding our follow-up review of the NTS sealed radioactive source program, we concluded that the program had improved since our last inspection, but that there were areas that should be strengthened. We found that Bechtel Nevada had not consistently implemented certain site radiological control program requirements for managing its sources. For example, we identified inaccurate information posted at one source location, a label affixed to a source that did not contain current information, and missing inventory and leak test results and inaccurate status information (e.g., out of use, awaiting disposal) for another source that was entered in the Source Locator Database.

We also found that radiological surveys indicating rooms' radiation zones were inconsistently posted at the storage locations of the sealed radioactive sources. Bechtel Nevada had identified the survey posting as a best practice and has a policy to implement radiological control best practices. Further, we noted that Bechtel Nevada had a practice of posting sealed radioactive source inventory and leak test results at the location of the sources; however, this information was not consistently updated.

Details of Findings

LEAD DUST

We found that surface lead dust contamination in the basement of Building 650, as well as the Detector Room and two offices above the basement, exceeded Bechtel Nevada's established threshold levels. Further, Bechtel Nevada had not taken action to make surfaces in these contaminated areas "as free as practicable" of lead dust, as required by OSHA.

Building 650 is an active office building that gets a large number of visitors because it is the NTS location for picking up and dropping off personal radiation dosimeters. The basement and the Detector Room, which is on the main floor in Building 650, are used to store, among other things, radioactive liquids; solid radioactive materials, including sealed radioactive sources; laboratory control samples once used for research; and more than nine tons of lead bricks that were used several years ago for radiation shielding. We observed that the lead bricks were peeling and covered with lead dust.

OSHA regulations establish thresholds for airborne concentrations of lead dust and require employers to establish a lead dust cleanup program that is sufficient to maintain all surfaces "as free as practicable" of accumulations of lead dust. In response, Bechtel Nevada developed lead dust surface standards, including a specific contamination threshold for surface swipe tests.

During 2003, Bechtel Nevada's Industrial Hygiene Department (IH) conducted a site-wide toxic metals characterization survey using two statistically-based sampling approaches. The 2003 survey listed the results of all of the samples, including those for lead dust, as being below Bechtel Nevada's threshold limits. We determined that although Building 650 was included in the survey, the basement, Detector Room, and the two offices above the basement were not sampled at that time. We were advised that the decision not to sample these areas was not intentional, but was based upon the statistical sampling methodology.

During November 2004, a Bechtel Nevada employee who had to enter the basement to perform newly assigned duties notified IH of the lead bricks in Building 650, which had been stored there since at least the early 1990s. In response, IH took air and surface samples in the areas where the lead bricks were located, as well as in the surrounding areas. We were told by a Bechtel Nevada IH official that if it were not for the 2003 survey data, he would have extended his sampling to all areas of Building 650. IH subsequently reported that all air sample concentrations of lead

dust were far less than OSHA's airborne threshold requiring action, but that many surface test results from the basement, the Detector Room, and the two offices above the basement exceeded Bechtel Nevada's surface lead dust threshold.

Subsequently, IH required the doors to the basement, the Detector Room, and the two offices to remain locked and access to the areas to be limited until the lead bricks could be encapsulated to prevent further contamination. Bechtel Nevada locked the doors and placed all the keys under the control of one individual.

After our on-site review, we were told that the lead-dust contaminated carpet in the two offices was removed, but that Bechtel Nevada still needed to clean up the remaining lead dust contamination in the two rooms. We were advised that the two rooms remained unoccupied, locked, posted with warning signs, and key-restricted. As of December 2005, Bechtel Nevada had a remediation plan, but not a specific timeframe, for encapsulating or removing the lead bricks and cleaning up the lead dust in all four areas, but was not authorized funding to perform this work.

Although Bechtel Nevada took actions to limit access to and reduce usage of the basement, the two offices, and the Detector Room, these areas continue to be a potential health hazard. For example, an official accountable for a sealed radioactive source stored in the basement must periodically enter the basement in order to inventory the source in accordance with Federal regulations. As an interim measure, Bechtel Nevada developed and implemented a control plan for entry into these spaces with industrial hygiene support to facilitate the annual inventory of the source. We believe Bechtel Nevada and the successor contractor should continue the interim measures in Building 650 and continue to work with the Site Office to develop and fund a long term solution to remediate lead dust contamination that exists from legacy hazards such as un-encapsulated lead bricks at NTS.

RADIOLOGICAL CONTROL

We found that a number of the specified radiological control violations did exist; however, Bechtel Nevada had self-reported them and was in the process of verifying the completion of the corrective actions identified in its associated corrective action implementation plan. We did not substantiate the remaining alleged radiological control violations.

It was alleged that Bechtel Nevada violated nuclear safety requirements regarding nuclear facility hazard categorization,

storage of nuclear materials above facility hazard categorization limits, and timely disposition of nuclear materials. Allegations also concerned the lack of “real time” (continuous) tracking, the ineffective coordination and management, and the unauthorized manufacturing of sealed radioactive sources; the use of “expired” sealed radioactive sources, which refers to the certification of the source specifications provided by the manufacturer; the lack of relevant training of radiological facility managers; and safety concerns involving legacy radioactive contamination in buildings.

We determined that the specific issues identified to us concerning the violation of nuclear safety requirements regarding nuclear facility hazard categorization, the storage of nuclear materials above facility hazard categorization limits, the ineffective coordination and management of sealed radioactive sources, and the lack of relevant training of radiological facility managers were already addressed in a July 2004 Bechtel Nevada self-review entitled “Radiological Material Control and Accountability Extent of Condition Review.” We further determined that Bechtel Nevada was in the process of verifying the completion of all corrective actions identified in its associated corrective action implementation plan and that NNSA is monitoring the corrective actions.

We did not substantiate the alleged violations concerning untimely disposition of nuclear materials, the use of expired sealed radioactive sources, the lack of real time tracking of sealed radioactive sources, the lack of authority for manufacturing sealed radioactive sources, and safety concerns involving legacy radioactive contamination in buildings. Regarding untimely disposition, Bechtel Nevada said that it has several radioactive materials in storage awaiting characterization and that the nuclear waste disposition is an ongoing, time-consuming process with limited funding. An NNSA radiological control program official said that he has been monitoring the contractor’s disposition of radioactive nuclear materials and believed that Bechtel Nevada was handling the issue in a responsible manner. Based upon our review of pertinent documents and interviews, we did not identify violations regarding untimely disposition of nuclear materials.

Regarding the use of expired sealed radioactive sources, Bechtel Nevada said that it contacted the source manufacturers and obtained extensions of the sources’ certifications. According to Bechtel Nevada management, the certification extensions were granted by the manufacturers because Bechtel Nevada documented

that the sealed radioactive sources still met the manufacturers' specifications. An NNSA radiological control program advisor said that NNSA did not have any policies prohibiting this and that he did not have any concerns about this issue. Based upon our review of pertinent documents and interviews, we determined that there were no violations regarding the process of obtaining extensions of source certifications and no prohibitions regarding the use of these specific sources with expired certification dates.

Regarding real time tracking of sealed radioactive sources, Bechtel Nevada said that it did not consider such tracking to be beneficial or cost effective. An NNSA radiological control program advisor said that NNSA does not require real-time tracking of sealed radioactive sources and did not believe that such tracking would be significantly beneficial. Based upon our interviews of several knowledgeable individuals and our review of pertinent documents, we found no violations regarding this matter and considered Bechtel Nevada's position to be reasonable.

Concerning Bechtel Nevada manufacturing sealed radioactive sources without the authority to do so, Bechtel Nevada said that it had not manufactured any sealed sources and did not have plans to do so, but there was no prohibition on doing so. An NNSA radiological control program advisor said that there are no regulatory restrictions regarding DOE and its contractors manufacturing sealed sources for their use. We confirmed that there was no prohibition regarding Bechtel Nevada manufacturing sources.

With respect to safety concerns involving legacy radioactive contamination, Bechtel Nevada officials said that such contamination might exist in exhaust fumes and vents in some buildings not in use; however, they were following all Federal guidelines for posting warnings where potential contamination might exist. They said that there is not a legacy concern in buildings where employees are working. An NNSA radiological control program official confirmed that the actions being taken by Bechtel Nevada were in compliance with legacy contamination safety requirements. Based upon several interviews, review of pertinent documents, and the lack of any specific allegations regarding legacy radioactive contamination violations, we did not substantiate the allegation.

**SEALED RADIOACTIVE
SOURCE PROGRAM**

We found that Bechtel Nevada had not consistently implemented certain site radiological control program requirements for managing its sealed radioactive sources.

Pursuant to Title 10 Code of Federal Regulations Part 830, “Nuclear Safety Management,” Bechtel Nevada must perform radiological work consistent with applicable technical standards, administrative controls, and other hazard controls adopted to meet regulatory or contract requirements. The regulation states that requirements must be implemented in a manner that provides reasonable assurance of adequate protection of workers, the public, and the environment from adverse consequences. To meet these requirements, Bechtel Nevada developed the “NV/YMP Radiological Control Manual” and sealed radioactive source control program implementation procedures entitled “Source Accountability and Control.”

The procedures require the status of each sealed radioactive source to be posted at its location and the name of the individual responsible for the sealed radioactive source to be listed on the source’s label. In addition, the procedures require Bechtel Nevada to verify that its official sealed radioactive source database, known as the Source Locator Database, is maintained and updated, as necessary, to reflect ongoing changes.

We identified that there was inaccurate information posted at one source location, a label affixed to a source at another location that did not contain current information, and missing inventory and leak test results and inaccurate status information (e.g., out of use, awaiting disposal) for another source that was entered in the Source Locator Database. Regarding the inaccurate information posted at the location of one source, we determined that the status of one source was posted as “out of service” instead of “in service.” Regarding a label affixed to a source at another location that did not contain current information, we determined that the label identified the former official in charge of the source instead of the current official. Regarding the Source Locator Database, we determined that the database lacked information regarding when required inventory and leak tests were conducted for a source and indicated that the source was at NTS and “in-use,” even though the source actually had been returned to its off-site owner.

**BEST
PRACTICES**

We also found that radiological surveys indicating rooms’ radiation zones were inconsistently posted at the storage locations of the sealed radioactive sources. Bechtel Nevada had identified the survey posting as a best practice, and Bechtel Nevada’s Radiological Control Manual states that Bechtel Nevada is firmly committed to providing a radiological control program that meets the “best practices” level of performance.

Further, we noted that Bechtel Nevada had a practice of posting sealed radioactive source inventory and leak test results at the location of the sources; however, this information was not consistently updated. Since there was not a written requirement to post inventory and leak test results, Bechtel Nevada said it would review the procedure to determine if the procedure was beneficial and then would take appropriate action to implement a consistent policy.

RECOMMENDATIONS

We recommend that the Manager, Nevada Site Office, ensures that the site operating contractor:

1. Takes timely and appropriate action to address the lead contamination in Building 650;
2. Develops and implements quality assurance controls to ensure that sealed radioactive source policies and procedures are effectively implemented; and
3. Determines if ongoing sealed radioactive source practices, such as the posting of room surveys and posting of inventory and leak test results, are beneficial and, if so, take appropriate action to develop and implement consistent policy.

MANAGEMENT COMMENTS

In comments on a draft of our report, management was in general agreement with the recommendations and identified corrective actions that it is taking to address the report recommendations. The comments are included in their entirety at Appendix B.

INSPECTOR COMMENTS

We found management's comments to be responsive to our report recommendations. As appropriate, we made changes to our report to address management's specific comments.

Appendix A

SCOPE AND METHODOLOGY

The field work for this inspection was completed in December 2005. We visited NTS and interviewed Federal and contractor officials from Bechtel Nevada; DOE, including NNSA; and OSHA. We reviewed relevant site, DOE-wide, and Government-wide documents.

As part of our review, we evaluated implementation of the “Government Performance and Results Act of 1993” in the context of activities included in our review. We did not identify any performance measure issues regarding the allegations received or the sealed radioactive source control program at NTS.

This inspection was conducted in accordance with the “Quality Standards for Inspections” issued by the President’s Council on Integrity and Efficiency.

Appendix B

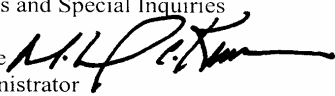


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April 24, 2006

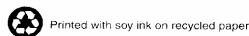
MEMORANDUM FOR Alfred K. Walter
Assistant Inspector General
for Inspections and Special Inquiries

FROM: Michael C. Kane 
Associate Administrator
for Management and Administration

SUBJECT: Comments to Lead Contamination Concerns Draft
Report; S05IS026/2006-12165

The National Nuclear Security Administration (NNSA) appreciated the opportunity to review the Inspector General's (IG) draft report, "Concerns Regarding Lead Contamination and Radiological Controls at the Nevada Test Site." We understand that this Inspection Report is the product of an allegation that lead bricks at the Occupational Medicine facility (Building 650) at the Test Site created a lead dust hazard and that there were numerous specific radiological control violations through NTS.

NNSA is in general agreement with the recommendations that were developed over the course of the inspection. In the case of the first recommendation to address the lead contamination, Bechtel Nevada not only has a remediation plan but has developed and implemented a control plan for entry into the locked spaces. This control plan is an interim measure until the remediation can be completed. Remediation is part of the Site Office Budget and will be completed as funding becomes available. The second recommendation suggests quality assurance controls related to sealed radioactive source be developed and implemented. NNSA believes that Bechtel Nevada has effectively addressed this issue. Bechtel Nevada Contractor Assurance Department verifies the effectiveness of implemented corrective actions. The Radiological Control Department has increased the number of assessments with no issues identified in the assessments performed in this calendar year. The third recommendation suggested looking at some practices to determine if they were beneficial. Bechtel Nevada did review the current source control practices and found them to be far in excess of the regulatory requirements leading to inconsistent implementation practices. Consequently, the Source Control Program has been revised to



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eliminate non-regulatory elements. The procedures governing this program are in the review process with a scheduled approval date of May 2006 and an implementation period to run through July 2006.

NNSA has some additional comments related to the report in general.

- We request that where the term “Bechtel” is used that it be changed to “Bechtel Nevada.”
- Page 4, paragraph 3, last sentence should be changed to “As of December 2005, Bechtel Nevada had a remediation plan, but not a specific time frame, for encapsulating or removing the lead bricks, **cleaning up the lead dust in all four areas, and was not authorized funding to perform this work.**”
- Page 4, paragraph 4, insert after “For example,Federal regulations” **As an interim measure Bechtel Nevada developed and implemented a control plan for entry into these spaces with industrial hygiene support to facilitate the annual inventory of the source.**
- Page 4, paragraph 4, last sentence should change to “Therefore, we believe that Bechtel Nevada should **continue with the interim measures in place for Building 650 and continue to work with the Site Office to develop and fund a long term solution to remediate lead dust contamination that exists from legacy hazards such as un-encapsulated lead bricks at the Nevada Test Site.**”

Bechtel Nevada has entered these items into their issues database and depending on risk, these items will be prioritized against other safety and mission issues.

Should you have any questions related to this response, please contact Richard Speidel, Director, Policy and Internal Controls Management.

cc: Kathleen Carlson, Manager, Nevada Site Office
Robert Braden, Senior Procurement Executive
Frank Russo, Environmental, Safety and Health Advisor
Karen Boardman, Director, Service Center

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