



July 30, 2009

Ms. Jane Brautigam  
City Manager  
P.O. Box 791  
Boulder, CO 80306-0791

Dear Ms. Brautigam:

As I mentioned in my letter of January 26, 2009, NIST received approval from the Nuclear Regulatory Commission (NRC) in January 2009 to proceed with decontamination of several spaces on our Boulder campus where a spill of plutonium occurred in June 2008.

In a letter dated July 24, 2009 (please see attached), the NRC concluded that NIST had met the requirements necessary to reopen these spaces. The NRC's conclusion was based on its review of NIST's final report on the cleanup, information collected through NRC inspections during the cleanup process, confirmatory surveys by an NRC-hired contractor (Oak Ridge Institute for Science and Education), and NRC review of additional information provided by NIST to the NRC.

A detailed accounting by the NRC-licensed service provider (*EnergySolutions*) engaged by NIST to conduct the cleanup showed that at least 84 percent of the plutonium sample involved in the spill was recovered for recycling or removed as waste, meaning that at most 16 percent of the sample may have been discharged to the Boulder sanitary sewer system when a researcher involved in the spill washed his hands in a laboratory sink shortly after the spill occurred. While the researcher clearly did not follow appropriate procedures and this was an unauthorized release, the maximum amount released fell within allowable regulatory limits. In addition, measurements conducted by a contractor hired by the City of Boulder with funds from NIST detected no radioactivity significantly different from natural background levels at several points within the sewer system, at the wastewater treatment facility, and in sludge diverted from the sewer system. We again acknowledge that this discharge should never have occurred.

In the course of interacting with NRC officials in their overall inspection effort, I learned recently that NIST Boulder possessed 10 small, low-activity sources that were not covered by NIST's specific materials NRC license. These were solid, 5-millimeter diameter foils of several different materials with low radioactivity levels (much lower than a household smoke detector). I also learned that a different, generally-licensed source was inappropriately removed from a static eliminator device and cut into pieces. While we know of no adverse impacts from these additional sources or actions, we regret any inappropriate use of materials. NIST has properly shipped all of these materials offsite.

In the year since this incident occurred, we have acted on the input from several independent reviews of the incident and of safety and management at NIST more broadly. We continue to strengthen our safety procedures and training, we are hiring new safety staff, and we are working to improve communications with our employees and the public.

Examples of safety improvements at the Boulder campus made since this fall 2008 include:

- NIST Boulder is no longer conducting research with radioactive materials under the specific materials NRC license.
- A senior-level NIST research-director position previously located in Gaithersburg, Md., was moved to Boulder to strengthen local line-management responsibility for the safety of all laboratory activities in Boulder.
- A safety manager with extensive government and industry experience was hired to oversee NIST Boulder's safety office.
- A senior-level site manager position to coordinate safety, emergency preparedness, and security for the entire DOC Boulder campus was posted, and we expect to make a selection in the near future.
- A safety audit of the NIST Boulder laboratories performed with the support of the Department of Energy resulted in a number of safety improvements, including strengthened inventory and handling procedures for hazardous materials.
- NIST Boulder developed an emergency notification checklist and a detailed communications plan for reporting events to various jurisdictions and agencies that regulate NIST's handling and disposal of hazardous materials.
- NIST Boulder developed and implemented a worksite training program for all staff in the prevention and reporting of accidental hazardous material releases to the environment.

Overall safety improvements at all NIST sites, including NIST headquarters in Gaithersburg, Md., include:

- Creation of a new executive-level position that now directly oversees NIST safety support operations in both Gaithersburg and Boulder.
- Substantial increases in funding for safety-related programs, equipment, and facilities.

- Increased emphasis on the need to continually improve safety practices as an explicit, integral part of all NIST operations, including adoption of best practices of national labs with excellent safety records.
- Improved communication about safety issues with internal staff and external stakeholders, including city and state governments, Congressional offices, and the general public.

Previous updates and reports on the incident can be found at:  
[http://www.nist.gov/public\\_affairs/releases/boulder-incident.html](http://www.nist.gov/public_affairs/releases/boulder-incident.html).

We take our responsibility to protect the health and safety of our staff and the surrounding community very seriously. Please do not hesitate to contact me if you have any questions about the decontamination or NIST safety improvement efforts.

Sincerely,

Richard F. Kayser  
Special Assistant for Environment,  
Safety, and Health



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION IV  
612 EAST LAMAR BLVD, SUITE 400  
ARLINGTON, TEXAS 76011-4125

July 24, 2009

U.S. Department of Commerce  
National Institute of Standards and Technology  
ATTN: Richard F. Kayser, Ph.D.  
Chief Scientist  
325 Broadway, MC 815.00  
Boulder, Colorado 80305-3328

SUBJECT: NRC REVIEW OF FINAL STATUS SURVEY REPORT

Dear Dr. Kayser:

As stipulated in Condition 6 of the Confirmatory Action Letter (CAL) issued by the NRC on July 2, 2008, you submitted a Final Status Survey Report (FSSR) by letter dated May 29, 2009. The staff from NRC and the Oak Ridge Institute for Science and Education (ORISE) reviewed the FSSR and requested additional information in a letter dated June 29, 2009. You submitted a revised Final Status Survey Report (FSSR) dated July 8, 2009, to the NRC for review. In your report, you provide the radiological survey results following decontamination for building surfaces and soils at your Boulder, Colorado, facility. These surveys were conducted in response to the plutonium spill that occurred on June 9, 2008.

In the FSSR, you conclude that the sample results obtained are less than the NRC-approved acceptance criteria. Accordingly, you requested NRC's review of the FSSR, and you requested authorization to allow all areas previously impacted by the plutonium spill to be free-released for unrestricted use. In response to your requests, we compared the FSSR to NRC guidance documents. We also reviewed the results of previous in-process inspections and NRC confirmatory surveys. The details of our review are provided in the Enclosure to this letter.

In summary, the information provided in the FSSR, as supplemented by information gained during in-process inspections and confirmatory surveys, provides reasonable assurance that all areas previously impacted by the plutonium spill are in compliance with the criteria specified in 10 CFR Part 20, Subpart E. Since the results of the final status survey demonstrate that the areas meet the radiological criteria specified in Subpart E, release of the facility is at your discretion.

While you have addressed Condition 6 of the CAL, please note that the CAL remains open until NRC has determined that your long term corrective actions have been implemented. Closure of the CAL will be documented under separate correspondence after NRC has assessed the effectiveness of your corrective actions.

Additional details regarding our independent inspection of the decontamination of your facility, as well as the other findings and conclusions of our special inspection of the plutonium contamination event will be discussed with you at a public meeting in Boulder during the month

of September 2009. The schedule and details of this meeting will be promulgated under separate correspondence. Subsequent to this meeting, the NRC will issue a publically available inspection report that documents our inspection results.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response if you choose to provide one, will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (ADAMS), accessible from the NRC's Web site at <http://www.nrc.gov/reading-rm/adams.html>. To the extent possible, your response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the Public without redaction.

Should you have any questions concerning this letter, please contact Ms. Vivian H. Campbell of my staff at (817) 860-8287.

Sincerely,

A handwritten signature in black ink, appearing to read "Arthur T. Howell for".

Arthur T. Howell, Director  
Division of Nuclear Materials Safety

Docket: 030-03732  
License: 05-03166-05

Enclosure:  
Safety Evaluation Report

cc w/enclosure:  
Colorado Radiation Program Director  
City of Boulder, City Manager

## Safety Evaluation Report

### **Background**

On June 9, 2008, a glass vial containing approximately 0.25 grams of mixed plutonium isotopes was ruptured at the National Institute of Standards and Technology (NIST) facility in Boulder, Colorado. The spill resulted in the contamination of several areas within the NIST facility. In response to this event, the NRC issued a Confirmatory Action Letter to the licensee on July 2, 2008 (ADAMS Accession Number ML081840441). Condition 6 of the Confirmatory Action Letter, in part, committed the licensee to provide the NRC with a written report documenting the results of the final status surveys following decontamination activities.

As stipulated by Condition 6, NIST submitted a Final Status Survey Report (FSSR) to the NRC by letter dated May 29, 2009 (ML091820146). The FSSR was reviewed by staff from NRC and the Oak Ridge Institute for Science and Education (ORISE). The staff requested additional information from the licensee in a letter dated June 29, 2009 (ML091801082). The licensee subsequently updated the FSSR and submitted Revision 1 of the FSSR to the NRC by letter dated July 8, 2009 (ML092010497).

### **Proposed Action**

The licensee's proposed action is to free-release the formerly plutonium contaminated areas for unrestricted use. Upon NRC acceptance of the FSSR results, the licensee plans to release the areas for use by NIST employees and contractors. This safety evaluation is the staff's analysis of the radiological consequences of the licensee's proposed action. The purpose of this evaluation is to determine if the proposed action can be safely accomplished.

### **Safety Evaluation**

The FSSR provides the results of the final status surveys that were conducted by the licensee to document the radiological status of its facility following decontamination. The purpose of this technical evaluation is to verify if the results of the final status survey demonstrate that the areas previously contaminated by the plutonium spill meet the radiological criteria for unrestricted use.

During this evaluation, NRC staff considered the guidance provided in NUREG-1757, Volume 2, Revision 1, "Consolidated Decommissioning Guidance: Characterization, Survey, and Determination of Radiological Criteria." In particular, the NRC staff compared the FSSR results to the evaluation criteria provided in Section 4.5, Final Status Survey Report, of NUREG-1757, Volume 2.

Section 4.5.2 of NUREG-1757 provides guidance on the types of information that are required to be submitted to the NRC in FSSRs. The requested information includes an overview of the survey results, the derived concentration guideline levels (DCGLs) that were used, and the survey results for each survey unit. The NRC staff conducted an acceptance review of the FSSR and concluded that the requested information had been provided by the licensee.

The licensee proposed soil and surface DCGLs as part of its revised Plutonium Spill Recovery Work Plan (ML090020007). The NRC conducted a technical review of the work plan and the proposed DCGLs during January 2009. The results of this review were documented in an NRC Memorandum (ML090240005). The NRC subsequently approved the revised document and the proposed DCGLs via License Amendment 34 dated January 24, 2009 (ML090240009).

ENCLOSURE

This license amendment authorized a building surface DCGL of 696 disintegrations per minute per 100 square centimeters for alpha particulate contamination and a soil DCGL of 0.42 picocuries of americium-241 radioactivity per gram of soil.

The licensee conducted the final status surveys from February 25, 2009, through April 7, 2009. The results of these surveys were included in the FSSR. The licensee and the licensee's contractor conducted 304 surface scans and collected 353 fixed point measurements, 353 removable contamination measurements, and 30 soil samples. The FSSR documents that all sample results are less than the NRC-approved DCGLs. Accordingly, the licensee concludes that the areas previously impacted by the plutonium spill meet the NRC's criteria for unrestricted use. During the review of the FSSR, the NRC staff confirmed that all sample results were less than the respective DCGLs.

The NRC conducted four in-process and confirmatory surveys between September 8, 2008, and April 16, 2009. The NRC's preliminary in-process and confirmatory survey results indicate that the areas formerly contaminated by the plutonium spill had been decontaminated to less than the NRC-approved DCGLs. The NRC's survey results will be documented in a report that will be issued at a later date.

During the April 13-16, 2009, inspection, the NRC was supported by representatives from ORISE, an NRC contractor specializing in radiological surveys. The results of the ORISE survey were documented in a confirmatory survey report to the NRC dated June 24, 2009 (ML092010497). The surveys conducted by ORISE included surface scans for alpha and gamma contamination, direct measurements for gross alpha activity, and analyses of soil samples for americium-241 radioactivity. The ORISE report concludes that all sample results are below the respective DCGLs. Further, the confirmatory survey results obtained by ORISE were found to be in agreement with the results presented in the licensee's preliminary final status survey data packages.

The NRC staff also compared the FSSR results to the guidance provided in NUREG-1575, Revision 1, "Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)." The staff concluded that the licensee created a sufficient number of survey units and collected a sufficient number of samples as recommended in MARSSIM. Further, NRC and ORISE staff conducted onsite reviews of the licensee's implementation of the final status survey during the April 2009 inspection. The inspection included a review of instruments used during the final status survey and the quality control methodologies. The staff concluded that the licensee's procedures and methods were appropriate.

## **Conclusions**

The NRC staff concludes that the FSSR provides a sufficient basis to allow the licensee to free-release the areas previously impacted by the plutonium spill for unrestricted use. The information provided by the licensee in the FSSR, as supplemented by information gained during in-process inspections and confirmatory surveys as well as the licensee's response to the NRC's request for additional information, provides reasonable assurance that all areas previously impacted by the plutonium spill are in compliance with the criteria specified in 10 CFR Part 20, Subpart E.