

Testimony of
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Committee on Science and Technology
United States House of Representatives

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Chairman Wu, Ranking Member Gingrey and Members of the Subcommittee, thank you for the opportunity to appear before you today to discuss the June 9, 2008, incident involving the release of plutonium at the National Institute of Standards and Technology's (NIST) Boulder Laboratory – as well as NIST's environment, health, and safety practices.

Introduction

Mr. Chairman, I deeply regret the incident that occurred at the NIST Boulder Laboratories on June 9, 2008. First, my top priority has been and continues to be the health and safety of our staff involved in this incident. I am pleased to report that, according to the latest analysis of the medical testing on the personnel involved, the physicians are relaying that no significant health risks are expected based on the test results to date. I hope the affected individuals and their families are encouraged by these test results. The physicians are relaying that the estimated doses, and the increased overall risk for cancer based on these estimates, are so small we don't expect there to be any clinically significant impact on either the short- or long-term health of anyone exposed. We will continue to provide our personnel with access to top medical care as we continue testing.

However, the incident raises very serious and significant issues at NIST with regard to safety, safety culture, training, and emergency response policies, protocols, and NIST's implementation of and adherence to them. The incident and the conditions that permitted this incident to take place are unacceptable, Mr. Chairman, and I pledge to you and this Subcommittee my personal assurance that we will do what is necessary to find the root cause or causes, take appropriate actions, and ensure to the best of our abilities that such a failure does not occur in the future.

The Department has taken a number of steps to ensure that independent reviews of NIST training, safety, and response protocols are conducted. Multiple investigations of the incident have been completed, are underway, or are to be conducted at NIST. These investigations include, but are not limited to: (1) the NIST Safety, Health and Environment Division (SHED) investigation; (2) the NIST Ionizing Radiation Safety Committee (IRSC) investigation; (3) the five preliminary individual experts' investigations ordered by the NIST Deputy Director; (4) the Department of Commerce (DOC) Inspector General (IG) investigation; and (5) the Nuclear Regulatory Commission (NRC) inspection. In addition, the need for a blue ribbon panel was identified by the Department, at the direction of Deputy Secretary John Sullivan, and work has already begun to establish such a panel. In addition, on July 1, 2008, Deputy Secretary Sullivan requested that the Department of Commerce's Inspector General conduct a broad review of management, training, safety, and response operations at all NIST facilities. We look forward to working with you as we institute these important additional reviews of NIST's safety practices.

We must be able to assure not just the Subcommittee, but the entire NIST family and the communities in which we live and work that NIST not only does cutting-edge, world-class research, but that we do so in accordance with the highest standards for safety, training, and emergency response preparedness. NIST science is renowned for its meticulous attention to detail; that same attitude must pervade our safety culture.

I am testifying today on the current status of this incident. We have made available information to this committee, our staff, the media, the public, and the NRC. This includes our 30-day report to the NRC and the reports to us by five individual experts we commissioned. We still have much to do and I will continue to keep you apprised of our progress as we gather more information.

Since the incident, NIST leadership in Gaithersburg and Boulder has been working to ensure our employees' safety and answer three key questions:

- 1) What happened on that day and how did NIST respond?
- 2) How could such an incident occur in the first place? and
- 3) What are we doing to ensure that we have the structure, policies and procedures in place to prevent such an incident from occurring in the future?

Although we do not have all of the answers to these questions yet – and I assure you that we will continue to work to get those answers, take appropriate actions, and keep you informed -- we do know that this specific incident was the result of both significant individual and systemic failures.

An Overview of the Events on June 9th

Before I begin with an overview of the events on June 9, let me state that the facts that I am about to relay represent NIST's best understanding of the facts at this time, based on testimony of those with first hand knowledge, and a review of all the evidence available to us currently. NIST's and other investigations are on-going, however, and we may learn more, or different, facts as we all continue to clarify our understanding of what happened.

Through interviews we have been able to ascertain that the incident involved a guest researcher who handled a radioactive source without appropriate training and supervision. During the course of this handling, the vial cracked and a portion of the approximately ¼ gram of plutonium contained in the vial spilled out.

The affected laboratory and an adjacent lab were sealed off and personnel who were identified as working in or near the lab were asked to remain in the area and any radioactive material on their clothing or bodies was removed. The personnel were also subsequently given bioassay tests to determine if any internal contamination occurred. (Since that time, several additional personnel identified themselves as having potential exposure and have had these tests conducted.)

External trace contamination was found on some employees, and in most cases this contamination was easily removed using soapy water. The personnel were sent home with the exception of two individuals who evidenced very low levels of contamination on their hands. (These two were provided with gloves to wear – to prevent the spread of the material -- until repeated hand washing eliminated the remaining contamination.). NIST radiation safety personnel supervised the testing of the adjacent areas leading to other parts of the building, a

men's restroom and doorways leading out of the building. Some areas of trace contamination were discovered and these areas were cleaned and retested to ensure they were contamination free. At that time, there was no evidence that there had been any contamination aside from those areas.

The affected laboratory and the adjacent connecting laboratory continue to remain sealed off for further testing and remain so pending approval of the decontamination process by the NRC.

As our investigation continued, we conducted subsequent extended interviews and discovered trace contamination in other areas. These areas, too, were thoroughly cleaned and retested to ensure they were free of contamination.

Failures Leading to the Incident

Mr. Chairman, NIST's safety culture is deficient. Later in this testimony I will focus on our policy and system for safety and training. Some things are clear:

- 1) The NRC regulates the use of radioactive materials at all NIST laboratories and is investigating the plutonium spill at the Boulder Laboratory and NIST's response. Specifically, the NRC is currently conducting an inspection that will result in the definitive account of the spill and its aftermath.
- 2) In January 2007, NIST filed an amended Application for Radioactive Material, an Addendum to the NRC Form 313, for the purposes of using encapsulated plutonium in research. In that amended license, NIST committed to do certain things, particularly in the areas of training. It appears that we did not meet those commitments. Such a failure is a serious breach and must be dealt with accordingly. I must stress that at this point our main focus is the health of those affected.

The researcher handling the source material at the time most certainly should have had the required training appropriate to his work and consistent with the commitments made under the NRC application. Partially as a result of this lack of training, actions taken during the incident and immediately afterward by the researcher appears to have exacerbated the extent of the incident and complicated the response.

While we cannot necessarily extrapolate from a single incident, I am also looking at issues that this incident raises about cultural barriers in our environment, health and safety policies and procedures, including our training practices, system-wide.

Response Subsequent to the Incident

Mr. Chairman, I have already taken several immediate actions and we are conducting our own investigations and assisting with external assessments. I have welcomed the involvement of the NRC, the Department of Commerce's Office of Inspector General, and individual radiation safety experts to provide advice, guidance and counsel -- tough counsel -- as to what NIST could have done, can do in the short term, and must do longer term to address shortcomings in our

safety, training and emergency response preparedness. I am moving the NIST Safety, Health, and Environment Division into the Director's office so that it now reports to the NIST Deputy Director, who is the agency's Chief Safety Officer. I have asked my staff to revamp NIST emergency communications procedures and we are developing a plan for moving forward which will include external input, participation and review.

In order to provide stronger on-site support to Boulder, I designated the NIST Chief Scientist, Dr. Richard Kayser, as the Incident Response Director, who took over for the NIST Boulder Laboratory's Director, Dr. Thomas O'Brian, who served as the Incident Response Coordinator. I directed Dr. Kayser to be on site in Boulder indefinitely leading this effort. His team is developing – and has already been implementing portions of -- an incident response plan which includes continuing to reach out to employees who have any concerns about their health, identifying any additional spaces that may need to be surveyed, better coordination of outreach and response to the Boulder community and other Federal, State, and local agencies, and Congress, and moving forward on the development of a decontamination plan. That decontamination will take place once all the other bodies conducting their assessment of the situation no longer need access to the lab—and once our decontamination plan has been reviewed and approved by the NRC.

I have traveled to Boulder and plan to return tomorrow. In addition, the Chief of the NIST Safety, Health and Environment Division, as well as the senior NIST health physicist from Gaithersburg have been stationed in Boulder for the past several weeks. Other NIST Gaithersburg personnel have also been on-site in Boulder as needed and additional personnel have been provided to Boulder by National Oceanic and Atmospheric Administration (NOAA) and by the Department of Commerce. We will continue to have appropriate resources on site until this cleanup is completed.

Results of Internal Investigation

While we have investigations ongoing, they have at this point revealed that the probable cause of the incident was handler error. Source material was removed from its secondary containment, and its vial broke after contact with a hard surface.

However, I want to make clear that overall organizational failures contributed to this handler error. Specifically:

- Procedures for acquiring source material were not followed as line management was not always aware of source material acquisition.
- Individuals, both those handling source material and those working in the vicinity, were not provided proper training or the necessary information to allow them to evaluate and understand the risks involved.
- Available training was inadequate for the circumstances.
- Lack of an emergency response plan contributed to the potential spread of contamination beyond the spill zone. Employees were neither prepared nor equipped to respond to the situation, and safety personnel were forced to respond as events unfolded, rather than from established protocols.

NIST's organizational structure contributed to an environment in which line supervisors failed to take adequate responsibility for safety issues, and safety personnel failed to assert a sufficient level of authority to ensure compliance with existing procedures and policies. In sum, a culture has developed with respect to safety issues that NIST understands must be addressed broadly, beyond this specific event.

Preliminary analysis indicates that multiple organizational failures contributed to the incident. Specifically, proper procedures were not followed for acquiring a radiation source and line management was not aware of the inappropriate handling of the source material. As a result, a proper risk assessment was not conducted.

There were no procedures in place for source handling and utilization nor was there an incident response plan or an audit program for radiation safety at NIST Boulder. Our investigation has revealed at this point that the scope of the hazardous materials programs expanded without reevaluation of the risks involved and without a commensurate strengthening of the radiation safety program. As a result, there was inadequate infrastructure to support the use of encapsulated sources. This clearly shows that we do not have systems in place to adequately identify and manage risks as they change. As we move forward and revise our safety program, we must integrate risk management into it. We must train our personnel so that when they are preparing to perform a task or proposing a new process/procedure that they are trained and have the resources to: 1. Identify the risks involved; 2. Identify the controls necessary to reduce or eliminate those risks; 3. Implement those controls; and 4. Monitor those controls to ensure the risks are in fact reduced or eliminated. If the fourth step identifies weaknesses in the controls or if the risk(s) have changed, our personnel will know they must go back to the first step and begin this process again.

Available training was inadequate and insufficient with respect to the number of individuals trained. Existing training requirements were ignored by researchers and not identified by safety personnel. Specifically, three individuals involved received inadequate or no training. We recognize that insufficient/inadequate training or training that was ignored, which are examples of management failures. We will integrate relevant training, with appropriate measures to document and evaluate the effectiveness of that training into our revised safety program. We will also include mechanisms to hold supervisors accountable for the training of their personnel.

Use of the posted radiation laboratory as a multi-use laboratory accessed by untrained and uninformed individuals contributed to risk, which was exacerbated by the lack of an accurate hazard posting on laboratory door.

In general, there was weak engagement by line management in overseeing personnel, programs, and safety-related activities. Similarly, safety personnel failed to identify and/or address obvious safety issues.

Timeline Since the Incident

Mr. Chairman, this section provides a summary of the communications and actions taken since the incident occurred.

Dr. William Anderson, Director of the NIST Electronics and Electrical Engineering Laboratory, sent an email to the NIST Chief Scientist, Dr. Richard Kayser, and me, at 9 p.m. on June 9th. I did not see that email until the following morning. Clearly, email is not sufficient in case of emergencies. I understand that on June 10th the Director of the Boulder Labs called the City of Boulder to inform them of the situation and offered to brief the City on the incident. Managers at NOAA, housed in a physically separate building on the campus, and the National Telecommunications and Information Administration (NTIA), which has people in the same building as the affected lab, were also apprised of the situation and offered a briefing.

In this instance, some of the initial outreach was timely; in other cases it was not. The lack of a clearly articulated plan with names and contacts hampered the efforts by NIST Boulder staff to inform those who must know or needed to know the situation. This is why immediately after the incident I directed the NIST Director of Emergency Services to develop a notification checklist for Boulder similar to what is kept in Gaithersburg. This can be used in an emergency to assure systematic notification and not rely on someone remembering something during a stressful situation. I will be happy to provide for the record more specifics on our emergency notifications procedures.

The Boulder staff was advised via an email and has continued to receive updates as new information becomes available. In addition, on June 10th, NIST Congressional and Legislative Affairs notified this Subcommittee and the staff of the local Colorado Representative and Senators of the incident. We have and will continue to provide updates as the assessment and investigation continues. In addition, a news release was provided to the local news media and posted on the NIST external Web site, and the NRC was advised about the incident, within the required 24-hour period.

The NRC arrived at NIST Boulder for an initial assessment on June 11th and I dispatched a health physicist from NIST Gaithersburg to assist the Radiation Safety Officer in Boulder.

As I mentioned earlier, the health physicists initiated the first of a series of bioassay tests for personnel either known to have trace external contamination or determined to be potentially contaminated, or for personnel who self-identified themselves to us as having a possible concern for their risk of exposure. Initial tests indicated no evidence of significant internal contamination of individuals. More sensitive follow-up tests as recommended by the Department of Energy (DOE) physicians and radiation experts showed some internal contamination for a small number of individuals. But as I mentioned, these results support our current understanding that the exposure level is very low and will accord no significant health risk to the personnel affected. We await additional test results.

Even more sensitive testing, known as a “TIMS” (thermal ionization mass spectrometry) test, has been initiated for all individuals who potentially have been exposed or who have requested to be tested. In addition, several other professionals who entered the lab as part of the investigation have been provided tests – which is a standard procedure for such radiation workers. These tests are complex and require several weeks to receive results. We hope to receive final results at the end of this month.

It is reported to me that on-going interviews on June 12th revealed that the guest researcher who had handled the plutonium had walked to other parts of the building before being decontaminated. Over the next few hours, the potentially affected areas were then surveyed. The resurvey showed trace amounts of contamination in one office on one desk, a lab notebook on the desk, and the chair associated with that desk, that had been used by the affected individual, as well as in a stairway leading to the office. As a precaution, the room was sealed until more thorough testing and evaluation could be completed. The hallway and stairway outside the affected room was surveyed and it was reported that no evidence of removable contamination beyond normal background was detected.

NIST provided notice of the new findings to Congressional staff, the City of Boulder, the media, the public, the NRC, and the Boulder NOAA and NTIA site. We called in and began our first consultation with the DOE National Nuclear Security Administration's (NNSA) Radiological Assistance Program (RAP).

Over that weekend, NIST health physicists (part of our safety operation) made the initial controlled entry into the sealed lab in order to conduct a radiation survey as part of NIST's internal investigation. Late Saturday, June 14th, the initial survey revealed contamination in the lab sink. It was subsequently learned -- through a re-interview -- that the researcher who worked most directly with the plutonium sample washed his/her hands in that sink during the incident, a critical fact that had not been initially reported.

I understand that a NIST Boulder official contacted the City of Boulder's waste water treatment plant manager early on Monday, June 16th, to alert the city that there was a possible discharge into the city waste water system. NIST was not able to quantify the amount of the possible discharge at that time.

As a result of the finding in the lab sink, public notice of the discovery that some unknown amount of plutonium was discharged into the city waste water system also was made to the DOC Boulder campus, Congress, the media, the public and the City of Boulder City Manager. The Boulder Director offered to brief the City management, NOAA, and NTIA on the incident. All NIST Boulder staff was invited to a briefing on the incident. We also initiated communications with the Department of Commerce OIG on the incident.

NIST worked to develop plans for the DOE RAP team to conduct a full radiation survey of the affected lab, to assist NIST's internal investigation, and to help determine the upper limit on the possible discharge of plutonium through the lab sink into the municipal sewer system. A briefing for NTIA staff also was scheduled.

Our latest information from the medical experts, based on the most recent test results, is that personnel with internal plutonium exposure are not expected to face significant health risks. As I mentioned, we are waiting on the most sensitive test, the TIMS, to confirm these findings. I am concerned for the health and safety of our personnel and we are getting advice from the best medical experts in the country and will do everything we can to ensure that the people affected get the best possible medical treatment.

Preliminary Corrective Actions Taken

First Mr. Chairman, I have ensured that NIST Boulder has issued a stop work order for all radioactive materials in use, and a preliminary decision has been made to limit the use of radioactive materials in Boulder in the future to sealed sources.

At my request, five eminent experts in radiation health safety conducted an assessment of the incident. They were asked to report their initial findings individually directly to me. On July 9th, I received the last of these reports. An author of one of those reports, Dr. Ken Rogers, is on the panel today and you will hear from him directly on his findings and recommendations. I recently received the last of these reports and we transmitted them to this Committee and made them public.

Their reports are sobering in their assessment of our challenges, and I take their words very seriously. Their views about our shortcomings confirm my belief of the need to focus our efforts on NIST's entire environment, health, safety, and emergency response protocols and safety culture to ensure that we are measuring up to both requirements and the highest expectations for a world-class organization. I expect that these experts will continue to provide insights to me and to others at NIST in the coming weeks.

Training Protocols for All NIST Employees

The lack of training provided disturbs me greatly, Mr. Chairman. I am committed to making the changes necessary to reduce to the maximum extent possible the opportunity for such a situation to occur in the future. This includes reevaluating our training to make certain it is appropriate, establishing testing mechanisms to assure training was mastered, and creating the controls to document training.

Mr. Chairman, let me initially say what our NIST policy is, and what it is supposed to be. I will then discuss what we believe we know at this time as to how NIST complied with or acts in accord with its own policy in this matter.

It is NIST policy to establish, coordinate, and maintain a comprehensive and effective NIST Safety Operational System (SOS) consistent with the standards prescribed by Section 6 of the Occupational Safety and Health Act of 1970, ANSI-Z10 Occupational Health and Safety Management System (OHSMS), and other applicable regulations.

Every manager, employee, and associate in the organization has the responsibility for systematically identifying risks, hazards, or potentially unsafe situations or practices and for taking steps to ensure adequate safety. Emphasis is placed on identification of risks and implementation of measures to control those risks. Implementation of effective OHSMS programs relies on recognition and adoption of the following principles by management, employees, and associates:

- a. Incidents/Accidents can and should be prevented.

- b. Line management is responsible for the safe conduct of operations. Management systems can be designed to avoid unsafe acts, unsafe conditions, and incidents/accidents. Individuals are, however, responsible for their own safe behavior.
- c. Management should establish challenging goals for safety, and take the responsibility to plan and implement actions to achieve the goals.
- d. The keys to effective line safety performance are management procedures that create a culture of safety, while defining and expecting accountability for results and minimizing hazards. Safe behavior and actions are expected and should be recognized, while unsafe behavior is discouraged and must be promptly corrected. There also must be effective safety oversight to assure compliance.
- e. One of the functions of the safety staff is to immediately stop any work where safety is questionable. Safety staff should be included in discussions of current and proposed operations to assist with identifying safety deficiencies within those operations and making recommendation to reduce the potential for incidents/accidents. Safety staff should develop safety programs that include documented training for line managers/supervisor, employees, and associates.

However, Mr. Chairman, in reality, the culture that existed at least in the laboratory involved in this incident was one in which safety was not the highest priority and led to an untrained guest researcher, improperly supervised, handling a dangerous radioactive source.

It is NIST policy that upon entrance on duty, new employees **must** attend a *general* safety orientation session presented by the NIST Safety, Health and Environment Division. One of the gaps that we have identified is that new associates (e.g., guest researchers from other institutions) are not currently required to attend this orientation. It is the responsibility of line supervisors to instruct *all* new or transferred appointees (employees and associates) assigned to their units, in the occupational safety, health and environmental requirements applicable to the specific job, preferably on the first day, but in any event during the first week of such assignment. Appointees who will be working in a laboratory must be instructed in NIST laboratory safety practices and be given a copy of the NIST Laboratory Safety Manual by their supervisor.

New or transferred appointees (employees and associates) who will be working in a laboratory or other hazardous environment, (e.g., mechanical shops), are to be provided adequate laboratory/shop-specific on-the-job training within one month of their employment. We are reviewing this requirement which currently would allow an individual to work in a lab for 30 days without appropriate training. Since functions differ among the laboratories/shops, each laboratory/shop is to develop its laboratory/shop-specific safety-training checklist to ensure that all safety areas are adequately covered. The laboratory/shop-specific safety checklist may be used to document the first month of employment safety training requirement. The safety checklist should identify the total number of hours necessary to cover all safety areas.

Line supervisors must ensure that pertinent safety and health instructions, relating to conditions and practices that may be necessary to eliminate or control specific job hazards, are routinely

incorporated into regular operating procedures, shop orders, preventive maintenance instructions, etc.

A minimum of 4 hours of relevant safety training must be provided to all employees and associates on an annual basis. Not less than quarterly in all non-administrative units (typically including laboratory activities; warehousing; trades, craft, maintenance, labor, protective, and transportation services; etc.) line supervisors are to schedule and conduct a safety awareness meeting with all assigned unit personnel, for the specific purpose of discussing safety issues pertinent to the unit's operations. Brief written reports of such meetings are to be forwarded through the applicable division or office chief to the NIST Safety, Health and Environment Division. Where there is need for specialized safety training beyond the capability or resources of a unit, the scope and method of training is to be determined through the coordinated efforts of the unit involved, the training personnel, and the safety staff.

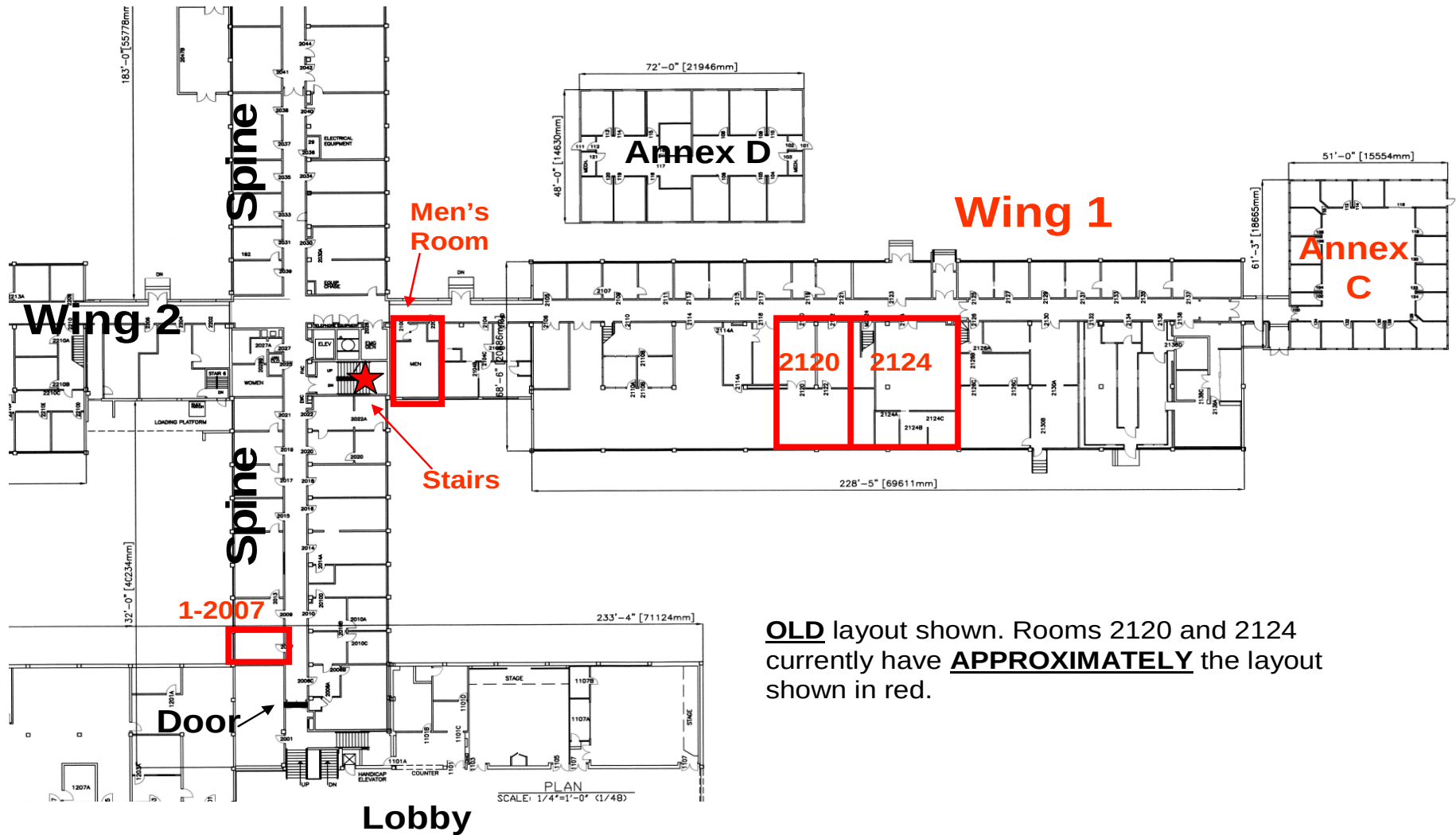
That is the policy. There must be effective controls to flag deficiencies, mechanisms such as testing to gauge mastery of the training material, and formal documentation of training. Our ongoing assessment will help us address critical areas for improvement.

Conclusion

Mr. Chairman, based on the information available at this time, this incident was preventable. Thankfully, the medical experts tell us that as of this time there are expected to be no significant health effects for the people involved. This incident is a sobering reminder of the importance of establishing clear, comprehensive and appropriate safety policies and rigorously adhering to safety protocols. As is abundantly clear, when we do not approach these matters with the necessary rigor, clarity and sense of purpose there can be serious consequences.

I again pledge to you my commitment to improving our environmental, health and safety practices, ingraining a sustainable safety culture and thereby ensuring the health and safety of our employees and local communities. I will report to you regularly and will keep you apprised of our findings and our progress. It is crucial to our ability to achieve our mission and ensure our workforce that they have a safe working environment.

Building 1, Floor 2



OLD layout shown. Rooms 2120 and 2124 currently have **APPROXIMATELY** the layout shown in red.



Dr. James M. Turner, Deputy Director

Dr. James M. Turner is the Deputy Director of the U.S. Department of Commerce's National Institute of Standards and Technology (NIST). He is also carrying out the responsibilities of the Director. (The NIST Director position is vacant.) Turner provides high-level oversight and direction for NIST. The agency promotes U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology. NIST's [FY 2008 resources](#) total \$931.5 million and the agency employs about 2,800 scientists, engineers, technicians, support staff and administrative personnel at two main locations in Gaithersburg, MD and Boulder, CO. Along with the Department of Energy Office of Science, and the National Science Foundation, NIST is slated for substantial budget increases for its core research programs under the President's American Competitiveness Initiative.

Prior to joining NIST on April 16, 2007, Turner served as the Assistant Deputy Administrator for Nuclear Risk Reduction in the Department of Energy's National Nuclear Security Administration. In that position, he was responsible for major projects in Russia to permanently shutdown their last three weapons-grade plutonium-production reactors. He also worked with foreign governments and international agencies to reduce the consequences of nuclear accidents by strengthening their capability to respond to nuclear emergencies.

Prior to that assignment, Turner held several senior management posts at DOE concerned with laboratory oversight and with nuclear safety and the safeguarding of nuclear weapons both here and abroad.

He holds degrees in Physics from the Massachusetts Institute of Technology (Ph.D.) and Johns Hopkins University (B.A.), and taught for five years as an Associate Professor of Physics and Engineering at Morehouse College.

Among other honors, he has received the U.S. Government Presidential Rank Award for Meritorious Service, three times received the U.S. Department of Energy Exceptional Service Award, and earned the Secretary of Energy Gold Award and the National Nuclear Security Administration's Gold Medal. Dr. Turner is an active member of the American Physical Society, the American Chemical Society, the American Nuclear Society, the American Association for the Advancement of Science, ASTM, the Council on Foreign Relations, IEEE, Phi Beta Kappa, Sigma Xi, and the World Affairs Council.

Dr. Turner is a native of Washington, DC, is married, and has five children and one grandchild. He enjoys doing yoga and Tai Chi. He and his wife, Paulette, reside in Olney, Maryland.