Final Report of the NIST Blue Ribbon Commission on Management and Safety

November 2008

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NIST
National Institute of Standards and Technology
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NIST Blue Ribbon Commission On Management and Safety

Final Report

November 2008

Submitted to
The Secretary of Commerce

By the members of
The NIST Blue Ribbon Commission
on Management and Safety

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Chapter 1: Executive Summary

On June 9, 2008, a plutonium incident occurred at the Boulder Laboratories of the National Institute of Standards and Technology (NIST). Investigations conducted in the three months after the incident exposed serious shortcomings in safety throughout the NIST Boulder organization. In response to the situation revealed in these investigations, the Secretary of Commerce, on September 16, established the NIST Blue Ribbon Commission on Management and Safety. The Commission's charge was to investigate and assess whether the current safety systems and the management structure are appropriate to ensure the safe operation of all NIST programs.

The Commission gathered information by studying the previous investigative reports and safety-related documentation from NIST and by holding two public meetings—on September 17 in Gaithersburg, Maryland, and on October 6 in Boulder, Colorado. At these meetings, we met with, listened to and questioned more than 35 individuals from all levels of NIST.

The Commission began its work with a guiding principle. A world-leading scientific institution must have the creativity to do great science and the discipline to do the work safely. The top-line summary of our deliberations is that there are serious safety concerns at NIST, with the root cause that NIST management did not provide the leadership to ensure a disciplined safety culture. The gravity of the situation is such that immediate attention is required.

The commission has summarized its concerns with five findings. First and foremost, **safety is not a core value at NIST**. A culture of safety must be led by the NIST director who has the responsibility to ensure a culture of safety integrated with the work. Leaders have abdicated this responsibility. Second, **safety is not integrated with the conduct of operations in a meaningful way across organizational units**. The identification of hazards and the evidence for the corresponding training are inconsistent at best. Third, **NIST has not benchmarked safety protocols and performance against similar organizations with strong safety cultures**. NIST does not have a set of meaningful metrics to manage its safety operations. Fourth**, NIST is**

plagued by a serious lack of resources for safety. This is evident in the facilities, equipment and funding for safety programs. In the Boulder laboratory, the condition of the structure makes safety a challenge. Finally we were encouraged that **the staff is eager, willing, and ready to embrace a safety culture**. We observed a desire for leadership in the safety area at every level of the staff we encountered.

Chapter 2: Findings

1) **Safety is not a core value at NIST**. Safety is a leadership responsibility that must be led from the top of the organization. While the operational aspects of safety can be delegated to the Deputy Director, the responsibility to ensure a culture of safety integrated with the work must be led by the NIST Director.

   The lack of leadership in this area is evident in the confusion over roles and responsibilities throughout the organization. This problem is observed at every level of the organization we examined. The problem is more acute in remote operations such as Boulder, where the site Director has no authority to manage safety operations.

   The safety organization (SHED) feels unsupported and unsure of its role. The research divisions see little value in a poorly supported SHED to help them to manage their operations safely. In addition, SHED is buried in Human Resources rather than being integrated into laboratory operations.

   The Commerce Department has a role to play in assuring a safety program at NIST. Currently NIST has no independent, systematic, and comprehensive internal audit procedures to ensure compliance with safety standards and regulations. The lack of a well-defined, performance-based set of standards, applicable to all laboratories, contributes to non-uniform and inconsistent safety practices in different parts of NIST.

2) **Safety is not integrated with the conduct of operations in a meaningful way across organizational units**. The identification of hazards and the evidence for the corresponding training are inconsistent at best. While there are pockets of excellence, institutional responsibility for ensuring safe operations across the complex is not apparent. A hazard-analysis system has not been implemented throughout NIST. Researchers at all levels complained about the lack of help in creating training programs. The safety organization complained about inadequate staffing levels and resources to

meet the need for training. NIST does not have a data base to track the training of workers involved in hazardous operations. We asked the question whether it was likely that a NIST employee or visitor could be working in a hazardous environment without appropriate training. The answer we received was an emphatic "yes."

Lack of integration of safety standards and practices is also observed in the planning, management and auditing of facility operations and maintenance. Safety does not appear to be adequately represented in the prioritization of facility projects, the design of projects (especially facility upgrades where patchwork retrofit "solutions" are incorporated) and the construction of projects. Of particular concern is the engagement and oversight of contractors where safety training and procedures have not been audited.

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3) **NIST has not benchmarked safety protocols and performance against similar organizations with strong safety cultures.** NIST does not have a set of meaningful metrics to manage its safety operations. There appears to be a lack of safety standards that are applied throughout the NIST organization. Leading indicators like the tracking of "near misses" are absent in the safety management program. In fact, a good-practice-safety-feedback program like "lessons learned" is not observed at NIST.

4) **NIST is plagued by a serious lack of resources for safety.** This is evident in the facilities, equipment, and funding for safety programs. In the Boulder laboratory, the condition of the structure makes safety a challenge. We observed laboratories that are deficient both in their design and in physical protective controls such as ventilation systems, resulting primarily from a lack of use of routine hazard assessment techniques and procedures. The poor physical condition and outdated design of some parts of the facility increase the potential for accidents and decrease the efficiency of research operations. Some safety equipment is in unknown condition, and there is little evidence of a system in place to validate effective performance of safety equipment. Inadequate resources appear to be allocated to safety elements of infrastructure renewal; to safety aspects of the planning and renewal design processes; and to identification, prioritization, evaluation, and application of engineering or other controls to risks at both campuses.

The conditions we observed and those described to us indicate a need for increased resources to be applied to safety-related programs.

5) **The staff is eager, willing, and ready to embrace a safety culture.** We observed, at every level of the staff we encountered, a desire for leadership in the safety area. There is an intense frustration with the lack of resources and knowledge to implement a world-class safety operation. The staff at all levels should be commended for the candor and openness in discussions with the Commission. The approach outlined by the recently appointed Deputy Director is a cause for optimism.

Chapter 3: Background

On the afternoon of June 9, 2008, a scientist working in the NIST Boulder laboratories mishandled and accidentally cracked a small glass vial filled with a brown powder, spilling a tiny amount. While handling the broken source bottle to contain the spill, he spread contamination in the work area and on his hands and shoes. As a "precautionary measure," he washed his hands, thus causing an unmonitored release of the substance down the drain. He then walked down the hall (inadvertently spreading contamination outside of the affected area) to notify his supervisor (also known as the Principal Investigator or PI) that the sample vial might be cracked. Meanwhile, other scientists continued to come in and out of the busy, multi-use laboratory, working on other projects. The PI, who then went to investigate the situation, also handled the source bottle, causing further contamination. Finally, realizing the very serious nature of the incident, the PI began notifying others and calling for emergency assistance.

The spilled powder was a stable chemical compound containing plutonium. Called plutonium sulfate tetrahydrate, with a chemical formula of $Pu(SO_4)_2 \cdot 4H_2O$, this powder was being used to calibrate and test a new detection system—the sort of improved detection technology used for nuclear safeguards and forensics. Eventually, for example, a "quantum sensor" detector like this might be used in airports and other public spaces to detect terrorist devices, such as so-called "dirty bombs."

Plutonium is a radioactive element posing a variety of health risks. In the case of plutonium sulfate tetrahydrate, the powder is easily dispersed, moderately soluble in water, and hazardous if inhaled or ingested. Because plutonium is a potent radiotoxin, its use in scientific research should always be tightly controlled and monitored by a safety management system. Such a system ensures that hazards are identified in advance, users are trained, possible exposure is avoided, and emergency contingencies are prepared for.

The June 9 plutonium spill in the NIST Boulder lab should never have happened. But it did.

What went wrong? What were the various causes of the contamination event? What was the root cause? What can be done in the future to ensure that all research projects in NIST laboratories are conducted safely?

Given the very serious nature of this incident, a number of investigations and reviews have been and are continuing to be conducted. The incident has been and is being studied from a variety of perspectives by experts called in by NIST and the Department of Commerce. The findings and recommendations in the first set of reports pointed to an overarching problem that was much wider in scope than just this one incident: NIST has a very poor safety culture.

Therefore, in addition to the numerous investigations that were looking in close detail at the plutonium spill incident and at safety systems in the Boulder laboratory, the Secretary of Commerce established a federal advisory panel to look at broader issues regarding management and safety at NIST. This document is the final report of that group, the NIST Blue Ribbon Commission on Management and Safety.

Process used by Blue Ribbon Commission

The Blue Ribbon Commission was established by the Secretary of Commerce, using the provisions of the Federal Advisory Committee Act. The charge to the Commission, as described in the *Federal Register* was "to investigate whether (a) the training, safety, security, and response protocols, (b) the implementation of those protocols and internal controls, and (c) the management structure at the National Institute of Standards and Technology (NIST) are appropriate to ensure the safe operation of all NIST programs." (See Appendix 1: Charge to the Commission.)

Six individuals were identified and appointed to the Commission. In keeping with the broad charge to the Commission, these experts brought extensive backgrounds of experience from government, industry, and academe. They had expertise in a wide range of areas, from management and organizational structure to training, from laboratory management and safety to hazardous materials safety, and from fire safety to radiation safety to chemical safety. (See Appendix 2: Biographies of Commissioners.)

In conducting their investigation, the Commissioners studied the reports prepared by other groups examining the plutonium spill and the related safety issues. The Commissioners also reviewed safety-related documents, manuals, and accident reports from NIST. (See Appendix 3: Reports and Appendix 4: Safety Manuals and Accident Reports.)

The Commission held two public meetings—in Gaithersburg, Maryland, on September 17, 2008, and in Boulder, Colorado, on October 6, 2008. At these meetings, the Commissioners heard and discussed reports from other groups studying NIST safety issues. The Commissioners met with, listened to, and questioned more than 35 individuals from all levels of NIST, including the Deputy Director; Operating Unit or Laboratory Directors; Division Chiefs; the Boulder Director; Division Safety Representatives (DSRs); professional staff from the Safety, Health, and Environment Division (SHED); and bench-level scientists and technicians. (See Appendix 5: Agendas of Public Meetings.)

Using all this information as input, the Commissioners, meeting in public and preparatory work sessions, discussed and prioritized the issues. The result of those deliberations is the Findings. (See Chapter 2.)

The Commissioners presented and discussed those findings with the Secretary of Commerce in a meeting on October 24, 2008. The final written report was delivered to the Secretary of Commerce in November 2008.

Organization of this written report

The heart of this report is Chapter 2, Findings, pages 5-7. Chapter 1, the Executive Summary, pages 3-4, provides a concise overview of the background, process, and findings.

Chapter 3, Background, pages 8-11, provides a very brief summary of the plutonium incident and the investigations which followed. This chapter also outlines the process and the sources of information used by the Commission in reaching its findings.

Summaries of each segment of the two open meetings are found in Chapter 4, Session Summaries, pages 12-33, and the names of all those involved in these open meetings are found in Appendix 6.

In addition to the information provided in this written report and its appendices, additional information is available on the website devoted to the work of the Blue Ribbon Commission (http://www.nist.gov/director/blueribbon/).

Chapter 4: Session Summaries

A) DOE Independent Review of Boulder—Findings and Recommendations

The presentation for this session (Gaithersburg, September 17, 2008) was given by Thomas Staker:

- Director, Office of Environment, Safety, and Health Evaluations, Department of Energy (DOE)
- Team Leader, DOE Review Team

This review of the NIST Boulder Laboratories was a "snapshot" of actual conditions and activities. It did not focus on the plutonium incident, but rather served as a broad review of safety. Areas studied included research, maintenance, and construction. The study involved going into "the field" (e.g., laboratories, construction sites, etc.), observing work, talking to the workers, and forming conclusions based on that activity.

The report found some positive program attributes, including the following:

- Strong engagement by management and staff
- Individual contributions to safety
    - There are some good individual examples of expertise in working with certain hazards.
    - Some organizations developed their own policies when they found a lack of policy or procedure.
- Effort initiated to eliminate excess chemicals

The report found many areas needing attention, including the following:

- Safety management system
    - Many documents were outdated or not used.
    - Many workers were not even aware of these documents.

- Roles and responsibilities
    - Director at Boulder site lacked authority.
    - Interface between safety, service, and research organizations wasn't well defined.
    - Researchers sometimes made modifications to facilities without consideration of safety issues.
    - Responsibility for testing ventilation systems and fume hoods was unclear, so devices had been untested for five years.
- Management processes
    - There was no system for tracking and monitoring.
    - Identification of requirements and standards was lacking and/or confusing.
    - There was a lack of well-defined processes to identify, analyze, and mitigate/control hazards (e.g., chemical management, reviewing hazards of new chemicals before bringing on-site).
    - "Near misses" were not tracked.
- Safety office training
    - Researchers had lack of respect for safety staff.
    - Expertise is lacking in some key areas (e.g., industrial hygiene, fire protection).
- Training
    - Training is an ad hoc process, without a lot of institutional training.
- Facility conditions
    - The Boulder facility is old and not conducive to safety operations (e.g., no fresh air for ventilation systems).
    - Water intrusion in areas with high-voltage electrical equipment presents serious safety hazards.
- Contract management
    - A stronger and more effective safety management system is needed for working with maintenance and construction contractors.
- Leadership
    - Safety is not being led in the organization; it's a bottom-up approach.
- Guest researchers

- About half of the researchers at Boulder are not laboratory employees.
- This large number of guest workers must be adequately trained and managed for safe operations.

The DOE review team concluded:

- In the absence of effective safety management systems, there is an over-reliance on untrained workers to identify and analyze hazards. This contributes to the extensive number of unsafe or unanalyzed conditions observed.
- NIST senior management and staff involved in the review understand the need for change, and management was developing actions at the time of the review.

B) Overview of NIST and Management of Safety

The presentation for this session (Gaithersburg, September 17, 2008) was given by Patrick Gallagher, newly appointed Deputy Director, NIST.

The organization chart for NIST shows that it is a very flat structure. It's highly dispersed and decentralized. The Operating Units enjoy strong autonomy to run their programs. It's a "bottom-up" organization, and it's lacking in a strong institutional culture or strong institute-wide management systems. The organization chart ("the sun and the planets" chart) shows a small central directorate with approximately 20 Operating Units reporting to one individual—the Deputy Director.

In recent years, there has been considerable turnover in the key central positions, such as the NIST Director (a political appointee position) and the NIST Deputy Director (the senior career position).

Safety is the NIST Director's responsibility, and the Deputy Director acts as the chief safety officer, with responsibility for safety then flowing down the line to the Operating Units. Operating Units are typically organized into Divisions. Division Chiefs play an enormously important role, with many of the operational functions of safety belonging with the Division Chiefs.

With these strong, very diverse Operating Units and Divisions, the central supporting safety function must assume a flexible role to adapt to these disparate organizations. Until very recently, the safety office (Safety, Health, and Environment Division, or SHED) was buried or embedded in the chief human capital office.

The relationship between Boulder and Gaithersburg is confusing. Boulder has basically been working as a remote campus of Gaithersburg. The various Division Chiefs in Boulder report to different Operating Unit Directors in Gaithersburg. The Boulder Director has no line responsibility or authority over the site or over the programs. The Boulder Director acts as a

spokesperson for the programs in Boulder and as a coordinator for local outreach to the Boulder community.

Another important management issue is the reality of NIST as a blended and hybrid workforce, with half of the technical workforce being guest researchers (called NIST Associates). For example, there was mandatory safety training for employees, but the training for associates was optional.

Gallagher concluded by reflecting on the impact of the plutonium incident on the organization. It has led to a realization that weaknesses in the safety system were not just specific weaknesses—they were systemic weaknesses. The NIST reputation—that "we can do things right"—has been tarnished, and the organization is suffering from a crisis of confidence. Safety has become an important issue for staff discussion more than it ever had been in the past. As a result, there exists a window of opportunity to make significant changes and move forward. The Blue Ribbon Commission can provide a very important perspective at a key time in the agency's history.

C) Focus Group Discussion with Laboratory Directors

This session (Gaithersburg, September 17, 2008) featured a focus group discussion with five Laboratory Directors.

Laboratory Directors feel direct responsibility and accountability for safety within their own Operating Units. Responses to safety issues are often at the local level (e.g., within an Operating Unit or Division) rather than at the institutional level. The NIST culture is a "bottom-up" culture. The types of safety reviews, reports, meetings, audits, and walk-throughs varied among Operating Units. There is some sharing of expertise and best practices among Operating Units and Divisions, but there could be much more.

The Directors expressed disappointment with SHED (Safety, Health, and Environment Division) because it doesn't have the type or depth of expertise they need. If the safety expertise wasn't in SHED, the Divisions and Laboratories had to do it themselves. Some Operating Units have had to come up with their own safety systems because the systems provided by SHED were inadequate or outdated. There is a lack of respect between SHED and the Divisions.

Directors admit that they can't be up to date on all safety issues. They are not trained as safety experts. The safety incident that happened in Boulder (i.e., plutonium spill) could just as easily have been a safety incident in one of the Operating Units in Gaithersburg.

Among suggestions offered by Directors on ways to bring about improvement were the following:

- Offer seminars on safety by our best scientists (e.g., scientists will listen to "heroes" and role models).
- Reward people for safety (e.g., safety award).
- Use outside reviews on safety issues (similar to annual technical reviews).
- Do benchmarking with other organizations.
- Share best practices among ourselves, across Operating Units and Divisions.
- Contract a safety professional within the Operating Unit (some of this is already being done).

- Build a centralized set of best practice and training videos.
- Build the capability to train new staff on a timely basis, throughout the year.
- Provide deeper knowledge and expertise in the central safety office.

Asked about concerns on how a new safety system might have a negative impact on current technical programs, Directors offered the following comments:

- Don’t adopt a one-size-fits-all solution because our programs are very diverse.
- If you were to set the bar uniformly for everyone at NIST, it would be inappropriate for some of our organizations because we are so heterogeneous.
- Can you have two “top” priorities (e.g., technical excellence, safety)?
- Don’t make the new safety system just an administrative exercise.

D) Focus Group Discussion with Division Chiefs

This session (Gaithersburg, September 17, 2008) featured a focus group discussion with seven Division Chiefs.

The Division Chiefs listed these items as key elements and traits of a safety system:

- The most important thing moving forward is getting the "buy-in" of our staff.
- We need a true, vigorous safety culture. We need to move beyond the reactive mode, to adopt a continuous-improvement mentality as opposed to a requirement-met mentality.
- We need to share best practices more often and across Divisions.

. The Division Chiefs expressed these concerns about possible negative impacts of a new system:

- Safety can't be a one-size-fits-all thing, and staff should not be told to do things that really don't fit in with the kinds of labs that they work in.
- You can't just mandate that you do this and this and this and then expect to get buy-in. But you can embrace this culture of safety, have people come together, tell them that these are our expectations, and then tell them they need to work together to share best practices.
- If the change in safety becomes a process-oriented system, with an emphasis on filling out forms and checking boxes, we will lose that buy-in.

In discussing hazard identification and the interface between scientists and safety professionals, the Division Chiefs expressed these views:

- We need to have people who are respected by our scientists to help us take second looks at our labs, but they need to be other scientists because the respect is essential.
- People who typically best understand the risk and the problems are those who have been working with the technology, not somebody who has been trained to do occupational health in a manufacturing environment.
- Three or four years ago, we had a recognized researcher give a safety lecture. It was treated as a research topic, very sophisticatedly, and the staff really embraced that lecture.

- The people in the safety office should provide the glue across the organization with these different subject experts.
- The safety people need to treat it as "we want to help you do your job better and more safely" rather than "you can't do this or this or that."
- Training needs to be more targeted for specific staff members and safety hazards. Too often, the training appeals to the lowest common denominator.
- It would be useful to have a central resource of either information or scientists who have the expertise to quickly evaluate and answer questions.
- We need a stronger resource base.
- We are becoming significantly more interdisciplinary. As people change fields, they deal with materials, chemicals, and hazards with which they have very little experience. We call upon experts in the Division to help us "cross-train."

Division Chiefs with experience in both Gaithersburg and Boulder made these comments when asked to compare the two environments:

- Boulder deals with more rainwater intrusions, but they aren't limited to just Boulder.
- There are cultural differences. Boulder is farther away from the "mother ship," and it was a more relaxed and, some would argue, a more creative environment. Scientists in Gaithersburg are equally exceptional and creative, but they "play things by the book" more often because they're close to DC.
- NIST operates on an expert-based model. You can go down the hall and find an expert in it. Gaithersburg is larger and covers a more comprehensive range of expertise. There is not quite the same broad level of experts in Boulder. But in Boulder, everyone knows each other a little more, so you have closer connections.
- All the upper-level politics take place in Gaithersburg. Boulder doesn't always know exactly what's going on, so that's why it was so important that the Boulder Director, Tom O'Brian, served as a good communication channel.

E) Focus Group Discussion with Staff of SHED (Safety, Health, and Environment Division)

This session (Gaithersburg, September 17, 2008) featured a focus group discussion with five staff members from the safety organization.

There was significant variation in the experiences described by these staff members. The experiences and safety culture described by those working in the radiation health area were positive:

- Safety was premier.
- The safety organization did not have to be the radiation policeman because we were able to be a support group and a support function.
- Safety is the way you do business, and you have to integrate it into the way work is done. Management expects certain behaviors and won't tolerate behaviors that don't match up to expectation. The regulatory climate around the reactor really drives the safety culture.

However, the experiences and safety culture described by others were negative:

- We weren't supported by management. When some of our people left, they were not replaced. We need more people.
- I have not felt that upper management considered safety functions to be paramount.
- We need things, but there seem to be many barriers that go up. You can speak up, but your requests get to a certain point, and then nothing happens.
- Through reorganization, we were pushed into a corner where resources were made tighter and tighter. You don't have to chop down a tree to kill it, if you ring it.
- Until recently, we had very little interaction with the NIST Director and Deputy Director.
- In some areas there is line accountability for safety, when the management structure has made it clear that there will be line accountability. But I wouldn't say that it's true across the organization. There are pockets where it is abysmal, where safety is just a nuisance to be tolerated or to be got around.

- There's a continuum from basically one extreme to the other, and it can vary at any level between Operating Units, Divisions—or even between specific laboratories. It's very hit or miss.

In discussing hazard identification and training issues, the focus group members offered these comments:

- All employees have to go through the safety orientation. It's relatively general.
- Associate training (i.e., for guest researchers) is just one hour, and it isn't mandatory. About once a month you get seven or eight people that do the training.
- Four hours of safety retraining are required a year, and the majority of staff fulfills their time requirements at our Safety Day. We'll bring in a dozen speakers on different subjects, and staff can sit for the day and meet their requirements. But it's not specific training for the hazards of their particular laboratory.
- We offer quarterly OSHA training in areas such as respiratory protection and hazard communication, but those courses are rarely full.
- Training seems to be looked at as voluntary. There is a serious attitude of "this takes me away from my work."
- We rely on Division Chiefs and Group Leaders to make the assessment about training needs. Yet those individuals often don't have the training to identify the hazards and determine what's necessary. We don't do a really good job of teaching them how to identify hazards, and we're putting a lot of responsibility on them without really giving them the tools.

Asked about areas where there are hazards that are not being adequately addressed, SHED staff mentioned the areas of chemical handling, chemical inventory, gas cylinders, exposure assessments, and exposure monitoring.

- We're creating hazards we don't need because we're just not efficient in how we do our ordering or how we share our chemicals. I think that we have an overabundance of chemicals because there isn't an inventory system where you can go in and see what we already have.

The group offered the following perspectives on the relationship and tension between researchers and safety staff:

- They [researchers] believe that because they have a doctorate and know a lot about the scientific nature of it (e.g., electricity) that they can handle it. And yet the controls may not be the most appropriate way.
- Very often you have people who are very good experts at the particular area that they are specialized in, but they have no broader picture of other safety functions.
- There is often a disconnect between the science aspect and the safety aspect.
- A detailed safety operational manual exists, but it was put on a shelf. You can write the best management system in the world, but if there's no buy-in, you don't have a management system.
- The culture here at NIST works for research. It's individually based; it's bottom-up. The people down at the bottom make a lot of decisions and they do a lot of great and creative things, but it's kind of contrary to what you normally see in a safety process.

The relationship between the safety staff in Gaithersburg and in Boulder was described as one of "professional coordination." Until last year, however, there was no direct management connection between the two locations.

The relationship with the Department of Commerce safety staff was described as follows:

- Commerce safety is very limited in what they can do, and they really don't add much.
- They don't come in here as auditors as you might expect a corporate safety group to do.
- They have had many management changeovers in recent years.

F) Focus Group Discussion with Bench Scientists, Technicians, and Division Safety Representatives

This session (Gaithersburg, September 17, 2008) featured a focus group discussion with eleven bench-level scientists and technicians, five of whom are Division Safety Representatives (DSRs).

Division Safety Representatives are very important. While safety is the formal responsibility of the line managers (i.e., the Operating Unit Directors, the Division Chiefs, and the Group Leaders), these line managers are juggling many duties and responsibilities. Therefore, many of the safety responsibilities get delegated to the DSRs. For example, DSRs do the lab inspections, do the training, and hold the meetings. It is important to note that DSRs are not trained as safety experts; they are scientists from within a Division.

Several DSRs reported that there is a lack of training for safety reps. When they became safety reps, they received no orientation from SHED. The section in the administrative manual that defines the duties of a DSR is not helpful in figuring out the details of the job. Further, there is a lack of safety training for all NIST employees. There is a need for better training materials for the new people constantly joining the labs. The availability of quality training materials is limited, and training is often needed in a more timely fashion. Safety reps who try to organize training for staff in their Divisions must come up with training materials on their own. DSRs disagreed with the earlier presentations by SHED staff regarding trainings. (The SHED staff reported earlier in the day that when they offered training courses, very few show up.)

When asked by Commissioners if it were likely that an untrained person could go into a laboratory with known hazards without the proper training, some DSRs and bench-level scientists answered, “yes.” Other DSRs pointed out that it varies a lot from division to division.

Funding for DSRs is handled differently in various Divisions. Some DSRs have a budget and others don't have a budget. In some Divisions, a significant portion of the DSRs' time (i.e., 20% or more) is allocated to safety duties. In other Divisions, the allocation is smaller (i.e., 10%). DSRs agree that they often devote more time to safety issues than is suggested by the formal allocation. This presents a challenge because the safety work is often not rewarded and can be perceived as taking time away from normal duties. Some DSRs felt strongly that the lack of a reward mechanism through the performance review process is a major problem. Other DSRs reported, however, that they felt rewarded for their safety work.

Safety reps feel that they have no authority and get lot of "push back" from other researchers on safety issues. They can tell people to do things, but if those things aren't being done, the only recourse is to go to the Division Chief.

Some scientists expressed concern that there isn't a system for discussing and learning from "near misses." Other scientists report that their Division is holding those sorts of discussions.

DSRs report that, because they are not safety experts, they have to rely on SHED to review their decisions. However, they don't feel they get the support they need from SHED. DSRs do not feel respected by the staff of SHED (with the exception of one SHED staff member who was singled out for praise by a number of DSRs). Communication is poor between SHED and the DSRs. Several DSRs report that they are now going outside (to vendors and contract trainers) to get the necessary training and to stay in compliance with regulations, such as Occupational Safety and Health Administration (OSHA) standards. DSRs commented that SHED is under resourced.

G) Tour of Building 1, NIST Boulder Laboratories

The Commissioners were taken on a short, 30-minute tour of Building 1 in Boulder (10/6/08). The purpose of the tour was to see some examples of the safety concerns that had been identified in recent weeks by earlier investigations.

The Commissioners visited four labs:

- In the first lab visited, an air intake had been added in the ceiling about seven years ago. However, the air intake was located within several inches of the front of a fume hood. This placement reduces the effectiveness and therefore limits the utility of the fume hood. As a short-term solution, someone had recently placed metal foil over the air intake so that air could no longer flow into it. In this first lab, the floor was dirty, and glassware and other containers were piled in open boxes on the floor, next to the fume hood.

- Another lab visited was a laser lab, so Commissioners raised questions about signage, warnings, and restricted entry. One of the rooms in this laboratory had only a single entrance/exit, which is a violation of code.

- In a third lab visited, the Commissioners were shown some of the problems with the building's ventilation system and with maintaining proper pressures. In this particular case, several holes were punched in a wall in order to get the proper pressure associated with a lab working with carbon nanotubes. The Commissioners also raised questions about policies and practices regarding confined spaces.

- In a fourth lab, one using high-voltage electric equipment, Commissioners were shown where several water intrusions had occurred in recent years. A bucket was being used to catch water in case it came in again. Because there is no central air system in this building, it is difficult to maintain the proper temperatures and humidity required in some of the labs.

The Commissioners did not visit the lab where the plutonium incident occurred because decontamination work was under way.

While walking through the hallways of Building 1 as they moved from lab to lab, Commissioners noticed a number of additional safety problems, including non-use of goggles, improper signage, poor housekeeping, excessive clutter, and unlocked fuse boxes.

I) Discussion with Thomas O'Brian, former Director of the Boulder Laboratories

This session (Boulder, 10/6/08) featured a presentation by and discussion with Thomas O'Brian.

Until he resigned several months ago, O'Brian had been the Director of NIST Boulder Laboratories and Chief of the Time and Frequency Division. His primary job had been as Division Chief, and the Director position was a collateral duty. He was the Director at the time of the plutonium incident.

O'Brian expressed disappointment that the Commission would not be meeting that day with representatives of the Boulder technical and administrative staff or with the Division Safety Representatives. He encouraged the Commission to consider this at a future date.
(The Commission Chairman replied that the Commission had met extensively with NIST staff at all levels during its public meeting in Gaithersburg. In that meeting, the Commission had gathered enough information to identify the major safety-related issues facing the staff and to assess the perspective of the staff, who displayed an eagerness for leadership in the safety area.)

O'Brian began his prepared remarks by stating emphatically that the people who work at NIST are top quality, with a strong commitment to excellence, integrity, responsibility, and reliability. O'Brian believed that NIST let down its own staff and the U.S. taxpayers by not having the right people in positions of importance.

He identified three areas of concern:

- Senior leadership in the Electronics and Electrical Engineering Laboratory (EEEL)
- Overall NIST leadership
- The safety program in general

O'Brian stated that he felt that the response to the plutonium incident was poor from "all of us," including himself. His resignation, in part, reflected his belief that leaders need to take greater accountability for the situation.

He expressed strong disagreement with the notion that "researchers aren't interested in safety, all they care about is getting their research done, and they're complaining that safety would interfere with their creativity." He reported that, in his 18 years at NIST, he had never heard any of the scientists say this.

He did, however, point out that staff will complain when people don't do their jobs because NIST technical staff members will not tolerate incompetence. He said that there was a strong desire among the staff for leadership and for competent safety professionals.

O'Brian reviewed the recent history of frequent turnover at the NIST Director and NIST Deputy Director level. He suggested that "something is broken in the way that the NIST Director position works." He suggested that a possible solution would involve making the NIST Director position a six-year appointment, thus spanning at least two Administrations and bringing greater stability and continuity to the position.

O'Brian expressed his belief that the difficult financial outlook facing NIST in the coming years increases the importance of making sure that the best people are in the right positions and doing the best job they can. He said that if people are doing their jobs, the scientific staff should not have to deal unnecessarily with administrative functions, including safety, for which they are untrained.

Finally, O'Brian discussed the structure and nature of the Boulder Director position.
He pointed out, "There was no one in charge in Boulder. I wasn't in charge, although I was the Director. But I had neither line authority over EEEL nor over the safety programs, nor over any other programs except those in the Time and Frequency Division, which is because I was the Division Chief." This structure contributed to the poor response to the incident.

He recommended that "an obvious change … would be to have somebody who was truly in charge of the NIST Boulder laboratories." He said that it could be a single individual who is responsible for all the technical programs and is also responsible for safety and other administrative functions. Or it could be two individuals serving in that context.

He was asked to comment on the relationship between and the perspectives of the scientific people and the safety people. He replied, “the scientific people felt they knew what they were doing, but they needed certain, very targeted help. The safety organization people felt that their responsibilities seemed to be broader in a sense, and perhaps not as detailed. … There were really two different cultures here with respect to how to carry out responsibilities.” O’Brian concluded by saying that NIST technical staff is “hungry for help in safety.”

J) Focus Group Discussion with Boulder Division Chiefs

This session (Boulder, 10/6/08) featured a discussion with six Division Chiefs. In some cases, the Division is located entirely at Boulder. In other cases, the Division operates at both the Boulder and Gaithersburg locations.

All the Division Chiefs affirmed that safety is a line management responsibility and that they take it very seriously. In spite of many excellent scientists, many of whom are working hard on safety-related concerns in their individual labs, there are structural and communication issues that make those efforts much more difficult.

One of the structural issues that presents a major problem is the lack of authority in the Boulder Director position. This is a problem, especially in those cases where an emergency response is required. It was pointed out that one structure that had been used, somewhat successfully, in the past at Boulder involved an Executive Officer for Administration who had a dual reporting relationship with the Director of Administration in Gaithersburg and the Director of the Boulder laboratories.

Another issue that presents problems is a lack of communication and collaboration between different parts of the organization. One Division Chief characterized the safety programs as "fairly strong, but somewhat isolated and individualistic and not sufficiently well-coordinated." Another said that "there were scientists who were taking safety seriously, but the problem is that we were dysfunctional as an organization. There are many ad hoc safety policies. We don't have uniform safety policies across NIST, and things have not been updated or supported."

There needs to be much more collaborative discussion when developing and implementing safety policies that are intended to be global in nature, and not just local in nature. The recent mode of safety operations tends to be very reactive, without a focus on implementation and collaboration. Because of the smaller size of Boulder as an organization (i.e., many fewer staff than in Gaithersburg), there is an opportunity to build stronger interconnections and personal relationships that could contribute to a better functioning system. In some cases, Divisions

"borrow" each other's DSRs for training because they are aware of the different expertises available across various Divisions.

One Division Chief pointed out that the research programs and environments are growing and changing rapidly. Staff who find themselves working in these new areas often "don't know what they don't know." There is a need for access to experts who can help identify hazards and help with training. Because of the very broad range of work, even within just one Division, it is not possible for one individual (e.g., a Division Safety Representative) to have all the required expertise. Division Chiefs and DSRs are concerned that they are expected to do safety training, even if they themselves aren't trained as safety professionals.

When asked if it were likely that a guest researcher could work in a laboratory without training and without knowledge of the hazards, the Division Chiefs felt that it was unlikely. They felt that training was provided when new researchers joined the labs, although much of it is not formally documented. Because of the informal nature of the training, the safety office and the DSRs might not know that the training had been provided.

Finally, the group discussed the type of experience that they would like to see in a Boulder Director. They said that a non-technical person would not be a good choice for leading a technical organization with a primary technical mission. The advantage of having a leader with a technical background is that the leader brings a love of science and an appreciation for the very meticulous science being done in the laboratories. A leader with a technical background can understand the problems, challenges, pressures, and opportunities faced by the technical staff and programs. The group is concerned that a Boulder Director who comes from an administrative background would be disconnected from the work, mission, and values of the organization.

They also expressed concern about a structure that would give a single Director all the responsibility for communicating and working with Gaithersburg. They find great technical value in the current operating structure, where there are multiple lines of communication and reporting back to various Operating Units in Gaithersburg. It helps avoid the problem of isolation, which had been a problem in Boulder in the past.

K) DOC Inspector General Investigation

This session (Boulder, 10/6/08) was a presentation by three members of the Office of Inspector General (OIG), Department of Commerce.

They reported on the progress of an ongoing independent OIG review—a review requested by the Deputy Secretary to determine whether:

- "NIST has established proper training, safety, and response protocols."
- "NIST's management structure facilitates its ability to ensure incident preparedness and response."

The focus of the OIG review is on radioactive materials safety.

To carry out their review, Commerce OIG staff have been working with the Nuclear Regulatory Commission (NRC), have been studying reports from internal and external reviews, and have held meetings with the following four groups:

- NIST senior management
- Safety and security personnel in Boulder and Gaithersburg
- Researchers in Boulder and Gaithersburg
- Other radioactive materials licensees

The internal and external reviews being studied by the OIG group are the same reviews being studied by the Blue Ribbon Commission (see Appendix 3). Common themes identified in these reports include the absence of a safety culture at NIST, concerns about training and supervision, and the safety of the Boulder facilities.

OIG staff have visited eight other licensees (four federal and four non-federal). There were a number of differences that have been identified between these other licensees and the NIST Boulder Laboratories:

- Other licensees are not working with powdered plutonium sources.
- Other licensees have broad scope licenses, rather than a special nuclear materials license (as is the case for NIST Boulder).

- Other licensees (unlike NIST Boulder) conduct analyses of facilities prior to initiating work with radioactive materials.
- One of the other licensees (unlike NIST Boulder) uses an automated system to control hazardous material acquisitions, use and training.
- Other licensees (unlike NIST Boulder) develop specific protocols for handling specific materials that they work with.

The OIG group also noted that there were some differences between the way radioactive materials are acquired and handled in Gaithersburg and in Boulder. Gaithersburg has a much larger program, an Ionizing Radiation Safety Committee, dedicated radiation research facilities, a dedicated building, and a radiation safety officer dedicated primarily to radiation safety.

The next phase of the OIG review will be looking at the extent to which NIST's business model may impact safety at NIST labs. Questions to be investigated include the following:

- How does NIST prioritize use of resources?
- How are safety budgets developed?
- How are safety resources allocated to Operating Units?
- To what extent does NIST rely on external funding sources to maintain staffing and activity levels?
- Do externally funded projects recover appropriate shares of safety costs?

For these questions, the OIG group is still gathering data, and final conclusions are not yet available. Recommendations to the Department of Commerce may be available in late November or early December.

In response to a question about the impact of Commerce Department's safety staff and program on the NIST safety operation, the Inspector General commented that the operating units within the Department of Commerce are very diverse and are pretty much left on their own. Since the plutonium incident, the Department has tried to apply some leadership to these questions to make sure things get examined. The DOE review and the Blue Ribbon Commission are examples of ways in which the Commerce Department is exercising leadership.

L) Overview of the Management of Safety in NIST's Construction Program

For this session (Boulder, 10/8/08), two leaders from NIST's Facilities Management Office gave a presentation and answered questions.

The Chief Facilities Management Officer (CFMO) outlined the scope of NIST's construction program and the components of the day-to-day management of the construction safety program.

She then outlined the areas where improvements are needed. For these areas, many of the needs have been identified, and work is under way to develop and implement the improvements. Among improvements anticipated are the following:

- In terms of compliance, more clearly establish the requirements and expectations in the contract.
- Develop stronger contract language for both compliance enforcement and accountability.
- Require contractors to comply with worker protection programs, such as hearing conservation and respiratory protection.
- Develop contract language for defaulting contractors based on poor safety performance.
- Develop contract language for incentives and penalties for contractors regarding their safety performance.
- Require contractors to document what safety-related and job-skill-related training they've provided.
- Develop the ability to notify the contractor's insurance carrier both of safety violations (when such occur) and of projects completed without violations.
- Develop the ability to direct a contractor on safety issues without incurring financial penalty to the government (i.e., change orders).

The CFMO discussed plans for repairs and renovations in both Gaithersburg and Boulder. A recently-completed physical-facilities condition assessment of Boulder facilities identified about $48 million worth of deficiencies in current buildings. A similar assessment several years ago in Gaithersburg identified about $350 million in deficiencies.

Currently, NIST has been investing between $20 million and $30 million a year in safety capacity and major repairs. It is estimated that NIST would need to invest about $50 million to $60 million a year to bring facilities from a “poor” condition to a “middle-point good” condition. In terms of facilities, NIST is not catching up; it is falling behind. With this limited budget, it is critical that projects be prioritized carefully and properly.

The CFMO distributed a table that has been used in the past to prioritize projects. The table lists the various key issues, from life safety to energy efficiency to system functionality, and it assigns point values to each issue. The total points provide a guideline for setting priorities. (The Commission raised a number of questions and concerns about the table and how it is being used. The CFMO reported that the table is in the process of being revised.)

The Commissioners raised a number of questions about possible compliance violations and about when decisions are made to shut down an activity or program. The Commissioners and the CFMO also discussed the importance of developing a better internal facilities inspection program and also obtaining outside inspections.

M) Improving Safety at NIST

This session (10/8/08) featured a presentation and discussion led by Patrick Gallagher, NIST Deputy Director. A copy of the illustrations accompanying Gallagher's presentation can be found on the Commission's website (http://www.nist.gov/director/blueribbon/improving_safety100608.pdf).

Gallagher identified three major ingredients that are required in a good safety management program:

- **Leadership**: The tone and feel of an organization's approach to safety clearly come from the top. Among the key leadership functions that touch on safety are responsibility; setting priorities and direction for the organization; defining roles of management, employees, and organizations; delegating responsibility and authority; and accountability.

  The Deputy Director outlined some of his ideas and plans for strengthening the Director's office; establishing a senior management position devoted to safety; benchmarking against other organizations; and reorganizing the roles, responsibilities, and authorities of the Boulder Director.

- **Professional safety support**: Safety is a discipline, a specialty. To thrive, there must be an institutional component with a professional staff. This safety office, which plays a central role in the safety management process, defines the requirements and performance standards that the organization is going to be held to. The professional staff serves as a resource for the line organizations and helps gather the data needed to meet reporting requirements. These data also serve as leading indicators that could reveal trends and problems in the organization before a safety incident actually occurs.

  Actions to strengthen professional safety support over the long term will include benchmarking against other organizations and hiring a senior safety executive. To meet the short-term need for safety support, Gallagher described a "surge," with resources being supplied by contractors and trainers in areas of immediate need.

- **Active participation:** Gallagher said that he sees "safety" as a verb, not a noun. It becomes fully integrated and embedded in the way that work is done. Creating a "safety culture" means that safety becomes so natural to the way you do your work every day that you almost don't recognize it's happening. Gallagher is looking for ways to improve the sharing of information and resources across organizational barriers. He's also planning to reduce the high degree of variability and decentralization in safety management by defining performance measures, metrics, and goals for the organization.

Following the plutonium incident and the various investigations, the current environment at NIST is one of heightened sensitivity by everyone to safety issues. The NIST staff has a strong desire to improve and wants to regain its pride in its core values of excellence, integrity, precision, and reliability.

Gallagher and the Commissioners discussed in more detail the position of senior safety executive and the safety office—its roles and responsibilities, its integration with other operations, the need for increased resources, its interface with the programs in the Operating Units and Divisions, and its interface with safety and emergency response organizations in the community. The group also talked about the importance of reviews and audits, both internal and external, as well as of benchmarking against a range of different institutions. One suggestion involved asking NRC and/or OSHA to work in a partnership mode that will help NIST achieve its regulatory goals.

Appendix 1: Charge to the Commission

U.S. DEPARTMENT OF COMMERCE

NIST BLUE RIBBON COMMISSION ON MANAGEMENT AND SAFETY

ESTABLISHMENT

The Secretary of Commerce (the Secretary), pursuant to duties imposed by law upon the Department of Commerce, including the Federal Advisory Committee Act (5 U.S.C., App.), and with the concurrence of the General Services Administration, hereby establishes the NIST Blue Ribbon Commission on Management and Safety.

OBJECTIVES AND DUTIES

The objectives and duties of the Commission shall be to investigate whether (a) the training, safety, security, and response protocols, (b) the implementation of those protocols and internal controls, and (c) the management structure at the National Institute of Standards and Technology (NIST) are appropriate to ensure the safe operation of all NIST programs.

Among other things, the Commission is encouraged to consider the relevant findings of:

- the Nuclear Regulatory Commission;
- the Department of Energy's Radiological Assistance Program;
- the NIST Ionizing Radiation Safety Committee;
- the NIST Safety, Health, and Environment Division;
- the NIST Visiting Committee on Advanced Technology;
- the five radiation and physics experts charged by the Deputy Director of NIST with providing their individual recommendations on corrective actions, avoiding future incidents, and improving safety performance and incident response; and
- the Inspector General's efforts to review the June 9, 2008 NIST plutonium incident, document lessons learned, and make recommendations accordingly; more broadly to review training, safety, and response operations at all NIST facilities; and more broadly to review NIST's management structure in terms of its ability to ensure incident preparedness and response.

The Commission shall submit oral and written reports to the Secretary on its findings.

The Commission shall function solely as an advisory body and will comply fully with the requirements of the Federal Advisory Committee Act.

MEMBERS AND CHAIRPERSON

1. The Commission shall be composed of not more than seven members appointed by the Secretary.

2. Each member shall be appointed for the duration of the Commission and will serve at the pleasure of the Secretary.

3. The Commission's membership will include qualified experts with public or private sector experience in one or more of the following areas:

- Management and organizational structure;
- Training and human resources operations;
- Laboratory management and safety;
- Hazardous materials safety;
- Emergency medical response;
- Environmental safety;
- Environmental remediation; and
- Security for hazardous materials.

4. Members shall serve as Special Government Employees (SGEs) and shall be subject to the ethical standards applicable to SGEs.

5. The Secretary shall appoint a Chair and a Vice Chair to serve in the absence of the Chair. Both members will serve in those capacities for the duration of the Commission, at the pleasure of the Secretary.

ADMINISTRATIVE PROVISIONS

1. The Commission shall begin its investigation within fourteen days of establishment. It shall provide an oral briefing of its preliminary findings to the Secretary within 45 days of beginning its investigation, and written findings within 90 days of beginning its investigation.

2. The Commission shall be under the direction of the Senior Advisor to the Deputy Secretary of Commerce (Senior Advisor), who shall serve as the Designated Federal Officer.

3. The Commission shall convene approximately three times, or at the call of the Senior Advisor, or his designee, provided that the designee is a Federal employee.

4. With the exception of support provided by the Senior Advisor, NIST shall provide funding and administrative support, including a Special Assistant, for the Commission.

5. Members of the Commission shall serve without compensation for their work on the Commission. However, while engaged in the work of the Commission, members may request travel expenses, including per diem in lieu of subsistence, as authorized by law for persons serving intermittently in government service (5 U.S.C. 5701 through 5707), consistent with the availability of funds.

6. The Senior Advisor may establish such subcommittees of Commission members as he considers necessary for the performance of the Commission's objectives and duties. The Chair, Vice Chair, and members of subcommittees shall be designated by the Secretary. Anticipated

subcommittees shall focus on: (a) training, safety, security, and response protocols; (b) implementation of protocols and internal controls; and (c) management structure. The subcommittees shall not advise the Secretary directly, but shall forward all draft and preliminary findings and work to the Commission so that it may deliberate on the matters before presenting findings to the Secretary.

7. The annual cost of operating the Commission is estimated at not more than $100,000, which includes .25 person-years of staff support.

8. The NIST Special Assistant, or her delegee, shall be responsible for filings and other applicable statutory requirements of the Federal Advisory Committee Act.

DURATION

This charter shall terminate one year from the filing of this charter with the appropriate U.S. Senate and House of Representatives Oversight Committees unless earlier terminated or renewed by proper authority.

_____ _____

Chief Financial Officer and Assistant Secretary for Administration

Date

Appendix 2: Biographies of Commissioners

Paul A. Croce, Sc.D.
Former Vice President and Manager of Research (retired)
FM Global

Dr. Croce has addressed a variety of safety, security, and protection problems in his research, including fire and explosion hazards in industrial and residential settings, quantitative risk assessments for various industrial operations and technologies (petrochemical, chemical, LNG, various computer-based systems and operations), transportation of hazardous materials, the management of technological risk, the evaluation of security and business interruption risk in the financial industry, and the effects of fluid stress in biomedical applications. As Vice President and Manager of Research for FM Global, the world's largest property insurer, he planned, directed, and oversaw a global scientific research effort into the various causes of property loss and the technological solutions for mitigating such loss.

Dr. Croce recently served as a Member of the U.S. Commission on Fire Safety and Preparedness for the Department of Energy Complex; as an invited participant to the White House Conference on Critical Infrastructure Priorities; and as the Chair of the International FORUM of Fire Research Directors, as well as a member of several review panels of LNG safety studies. He has been a member of and chaired several committees in professional societies and is a founder and former Chair of the ASME Safety Engineering and Risk Analysis Division. He is a Life Fellow of the American Society of Mechanical Engineers, a Life Member of the International FORUM of Fire Research Directors, and a Senior Member of the American Institute of Chemical Engineers.

In addition to FM Global, Dr. Croce has worked for Arthur D. Little, Inc.; the AVCO Everett Research Laboratory; and the NASA Ames Research Center. He has served in Vietnam with the US Army Corps of Engineers. He has a Bachelor of Science degree from the University of Rhode Island, a Master of Science degree from the Massachusetts Institute of Technology, and a Doctor of Science degree from Washington University (Saint Louis), all in mechanical engineering.

Kenneth P. Fivizzani
Research Scientist
Nalco Company

Dr. Fivizzani is a research scientist at Nalco Company. He is the chemical hygiene officer for Nalco's Naperville (IL) and Sugar Land (TX) Research Laboratories. He received both B.S. and M.S. degrees in chemistry from Loyola University of Chicago and a Ph.D. in inorganic chemistry from the University of Wisconsin-Madison.

He is a member of the American Chemical Society (ACS), the American Industrial Hygiene Association (AIHA), the Industrial Research Institute's (IRI) Environmental Health and Safety Directors' Network, and Sigma Xi. He was the 2007 chair of the ACS Chicago Section. He was the 2000 chair for the ACS Division of Chemical Health and Safety and continues as an executive committee member. He is a past chair (2002-2004) and a current member of the ACS Committee on Chemical Safety (CCS). For 1999-2001, he served as chair of the IRI Environmental Health and Safety Directors' Network. In 1988-89, he served as president of the Nalco Chapter of Sigma Xi, the Scientific Research Society.

Dr. Fivizzani is certified as a chemical hygiene officer by the National Registry of Certified Chemists. He serves on the Board of Editors of *The Journal of Chemical Health & Safety* and writes articles for "The Last Word" column in that journal. He has presented 30 papers at national ACS meetings to the Chemical Health and Safety, the Industrial and Engineering Chemistry, and the Chemical Education divisions. He has co-authored conference papers for the National Association of Corrosion Engineers, the Cooling Tower Institute (CTI), and the American Industrial Hygiene Conference & Exposition. He is an inventor or co-inventor on five U.S. patents. He has investigated corrosion inhibition and dispersion in boiler and cooling water systems. His current activity involves laboratory safety and safe use of chemicals in industrial applications.

Kenneth C. Rogers
Consultant
Former Commissioner of the Nuclear Regulatory Commission (1987-1997) (vice chairman)

Before his first-term nomination by President Reagan and confirmation by the Senate in 1987, Dr. Rogers served as president of Stevens Institute of Technology for 15 years. He joined Stevens in 1957 following research appointments at Cornell University. At Stevens he served the college as a professor, head of the physics department, dean of the faculty, and acting provost before becoming its president in 1972.

He has held appointments at Princeton University and the City University of New York concurrent with his Stevens positions. In 1987 he was designated President Emeritus at Stevens.

A physicist by training, Dr. Rogers's technical areas of expertise include plasma physics, particle accelerators, optical spectroscopy, elementary particle physics, and nuclear instrumentation. He is the author of more than 30 technical papers and two patents. Dr. Rogers was appointed by the Governor as a member of the New Jersey Commission on Science and Technology and is a member of numerous professional societies, including the American Physical Society and the American Nuclear Society. He is a Senior Member of the Institute of Electrical and Electronics Engineers and a Fellow of the American Association for the Advancement of Science.

He has served as a Director of the Public Service Enterprise Group (formerly Public Service Electric and Gas Company of New Jersey) and was a charter member of the Board of Director's Nuclear Oversight Committee. He has been a Director of the First Jersey National Bank, as well as a Trustee of the Christ Hospital, Jersey City, NJ; the Association of Independent Colleges and Universities in New Jersey; the Independent College Fund of New Jersey; and the Hoboken (NJ) Chamber Orchestra.

He received a Bachelor of Science degree in physics from St. Lawrence University (1950) and a Master of Arts degree in physics (1952) and doctor of philosophy degree in physics (1956) from Columbia University. He was awarded an honorary doctorate degree by St. Lawrence University in 1983 and by Stevens Institute of Technology in 1987. He was the first recipient of the Hudson County (NJ) Humanitarian Award of the National Conference of Christians and Jews in 1985.

Charles V. Shank, Sr.
Fellow, Janelia Farm Research Center
Former Director, Lawrence Berkeley National Laboratory (1989-2004) (chairman)

After graduating with a Ph.D. in electrical engineering from the University of California, Berkeley, in 1969, Charles V. Shank headed to the most successful industrial research institution in the world, the AT&T Bell Laboratories in New Jersey. He spent 20 years there, as both a researcher and director, and his work changed the way scientists see and understand the most fundamental events that shape our world. From there, he went on to play a major role in shaping how scientists approach basic questions about how our world works.

Shank's pioneering research at the Bell Labs introduced the use of short laser pulses to the study of ultrafast events, which take place in a millionth of a billionth of a second. The technique allows researchers to observe atomic motions and interactions with extraordinary time resolution, gaining a better understanding of how energy is stored and transferred within materials. Of particular note was his work in understanding the first step of vision by elucidating the femtochemistry of the molecule rhodopsin.

In 1989, Shank moved to the Lawrence Berkeley National Laboratory in Berkeley, California, where he served as Director until 2004. The oldest of the Department of Energy's national laboratories, the Berkeley Lab conducts a broad range of research, recently contributing to the development of nanoscience, opening new questions about energy and the universe, and using advanced computing as a tool for scientific discovery. During his 15-year tenure there, Shank oversaw remarkable growth of the lab. Under his direction, the Berkeley Lab emerged as a leader in the field of supercomputing and joined with two other national labs to form the Joint Genome Institute, a major contributor to the decoding of the human genome.

Charles V. Shank earned his bachelor’s, master’s, and Ph.D. degrees from the University of California, Berkeley. He directed the Lawrence Berkeley National Laboratory for 15 years and is now a professor emeritus of chemistry, physics, and electrical engineering and computer sciences at UC Berkeley. He has been honored with the R.W. Wood Prize of the Optical Society of America, has received the George E. Pake Prize and the Arthur L. Schawlow Prize of the American Physical Society, and is a member of the National Academy of Sciences and the National Academy of Engineering.

William VanSchalkwyk
Managing Director
Environment, Health, and Safety Programs
Massachusetts Institute of Technology

William VanSchalkwyk is the chief Environmental, Health, and Safety (EHS) central administrator at the Massachusetts Institute of Technology. In this capacity he is responsible for the implementation and performance of MIT's EHS Management System (MIT EHS-MS) and for strategy development of EHS programs. At MIT he is also responsible for issues emerging into EHS systems, such as security of hazardous materials and emergency management for laboratory settings.

William has extensive environmental management experience, and he is a certified safety professional and certified hazardous materials manager. He has more than 20 years experience in EHS management, formerly in the corporate organization of a Fortune 50 corporation and for the past 11 years at MIT. He is an alumnus of the University of Massachusetts Lowell where he received a Bachelor of Science degree in chemistry and a Master of Science degree in environmental studies.

William is currently chair of the technical program committee of the Campus Safety Health and Environmental Management Association (CSHEMA) and a member of the several other professional safety and environmental management societies.

A. Thomas Young
Former Executive Vice President
Lockheed Martin Corporation (retired)

A. Thomas Young, since retired, was Executive Vice President of Lockheed Martin Corporation, headquartered in Bethesda, MD. Before assuming that position in March, 1995, Mr. Young was President and Chief Operating Officer of Martin Marietta Corporation. Earlier, he was a Senior Vice President of Martin Marietta Corporation and President of Martin Marietta Electronics & Missiles Group in Orlando, Florida. He joined Martin Marietta in 1982 as Vice President of Aerospace Research and Engineering.

Prior to joining Martin Marietta, Mr. Young was Director of the National Aeronautics and Space Administration's Goddard Space Flight Center in Maryland from 1980 to 1982. During a 12-year career with NASA, he served as Deputy Director of the Ames Research Center in California, Director of the Planetary Program in the Office of Space Science at NASA Headquarters in Washington, D.C., and as Mission Director of the Project Viking Mars landing program at Langley Research Center in Virginia.

Mr. Young has received numerous honors and awards for his contribution to the nation's space program, including NASA's highest award, the Distinguished Service Medal, for his role in the Viking project. He also received the Outstanding Leadership Medal for his contributions to the Voyager program, the Meritorious Executive Presidential Rank Award, and the Distinguished Executive Award.

Born in 1938 in Wachapreague, Virginia, Mr. Young received his bachelor of aeronautical engineering degree and a bachelor of mechanical engineering degree in 1964 from the University of Virginia and a master of management degree in 1972 from the Massachusetts Institute of Technology, which he attended as a Sloan Fellow.

Mr. Young is chairman of the National Business Committee for the Arts. He sits on the board of directors for the BFGoodrich Company; Cooper Industries, Inc.; Dial Corp.; and the Potomac Electric Power Company. He is director of the Virginia Engineering Foundation of the University of Virginia's School of Engineering and Applied Science.

He is a Fellow of the American Institute of Aeronautics and Astronautics and of the American Astronautical Society and a member of the National Academy of Engineering. He also holds an Honorary Doctor of Science degree from Salisbury State University in Maryland.

Appendix 3: Reports

Reviews by five independent radiation health and safety experts

- On June 22, NIST appointed five external experts to Special Government Employee positions in order to conduct the external review. The experts were selected and invited by the IRSC Chair based on their experience, expertise and ability to provide critical, independent judgment to the review. The experts were:

  Paul S. Hoover
  Senior Advisor, Radiation Protection Division, Los Alamos National Laboratory

  Lester A. Slaback, Jr.
  Former Supervisory Health Physicist, NIST (retired in 2001)

  Kenneth C. Rogers
  Former Commissioner, Nuclear Regulatory Commission (1987-1997)

  J. Michael Rowe
  Consultant
  Former Director, NIST Center for Neutron Research (retired 2004)

  Richard E. Toohey
  Director, Dose Reconstruction Programs, Oak Ridge Associated Universities
- The five external experts conducted their on-site review in Boulder from June 23-24. These experts wrote individual reports with their preliminary findings and submitted them to NIST Deputy Director James Turner between June 27 and July 9.
- The statement of work for the experts asked them each to:
  - Identify the cause(s) of the incident and any contributing factors;
  - Evaluate the NIST response to the incident;
  - Evaluate the report on the incident that will be prepared by the NIST Ionizing Radiation Safety Committee at the request of the NIST Deputy Director; and
  - Provide the NIST Deputy Director with their individual recommendations on the following: (a) corrective actions, (b) avoiding future incidents, and (c) improving safety performance and incident response.

NIST 30-Day Report on Radiation Incident at NIST Boulder

- Report submitted pursuant to 10 CFR 30.50©(2), as specified in paragraph 4 of NRC's Confirmation Action Letter of July 2, 2008

Initial Report of Plutonium Contamination at NIST Boulder

- Prepared by NIST Ionizing Radiation Safety Committee (IRSC)
- NIST Deputy Director asked the NIST Ionizing Radiation Safety Committee (IRSC) to conduct a review into the circumstances and actions leading up to, including, and following the contamination event. The review was to include an examination of NIST's authorization, control, and oversight of work using the plutonium compound, and the NIST response to the incident. The IRSC was asked to:
  1. Identify the cause(s) of the incident and any contributing factors;

2. Evaluate the NIST response to the incident; and
3. Recommend the following: (a) corrective actions; (b) methods to avoid future incidents; and (c) ways to improve safety performance and incident response.

- Report submitted to NIST Deputy Director on July 30, 2008
- The report is available at: http://www.nist.gov/public_affairs/releases/IRSC_Pu_Report_Final.pdf

"Independent Oversight Special Review of Safety at the National Institute of Standards and Technology Boulder Laboratories"

- Special Review team was led by the Office of Independent Oversight, within the Department of Energy's Office of Health, Safety and Security
- Prepared at the request of the Department of Commerce
- Review completed on August 28, 2008

Appendix 4: Safety Manuals and Accident Reports

NIST Safety Policies and Procedures

- Safety Operational System - NIST Admin. Manual 12.01
- Accident Investigation and Reporting - NIST Admin. Manual 12.02
- Radiation Safety - NIST Admin. Manual 12.03
- Ionizing Radiation Safety Committee Charter
- NIST Personal Protective Equipment Policy
- NIST Office Safety Manual
- NIST Laboratory Safety Manual
- Health and Safety Instructions
  - #1 - Compliance with OSHA Standards and Environ. Regulations
  - #2 - Laboratory Fume Hoods
  - #3 - Liquid Hydrogen Operations
  - #4 - Hearing Conservation
  - #5 - Compressed Gas Cylinders
  - #6 - Peroxide Forming Compounds
  - #7 - Hazard Communications
  - #8 - Common Organic Solvents
  - #9 - Work in Confined Spaces
  - #10 - Carcinogens
  - #11 - Eye Protection Program
  - #12 - Foot Protection
  - #13 - Laser Protection
  - #14 - Laboratory Vacuum Systems
  - #15 - Chemical Container Labeling
  - #16 - Hazardous Chemical Waste Disposal
  - #17 - Respiratory Protection
  - #18 - Asbestos Containing Material
  - #19 - Biosafety
  - #20 - Chemical Hygiene Plan
  - #21 - Control of Hazardous Energy
- Safety Health and Environment Division—Good Work Practice Guides

Safety Accidents and Reports

- Annual Reports
  - FY 2003
  - FY 2004
  - FY 2005
  - FY 2006
  - FY 2007
  - FY 2008
- Laser Incident Investigation Report—March 5, 2008

Appendix 5: Agendas of Public Meetings

NIST BLUE RIBBON COMMISSION ON MANAGEMENT AND SAFETY
LECTURE ROOM B
BUILDING 101
September 17, 2008
Agenda

9:00am **Administrative Formalities** - Administrative Session
Ethics Briefing – Dana Jacob, DOC Office of General Counsel

9:15am **Call to Order** – Open Session

9:15am **Welcome and Charge to the Commission**
Thomas L. Hemingway, Designated Federal Official

9:20am **DOE Independent Review of Boulder – Findings and Recommendations**
Presentation by Tom Staker, DOE Team Leader

9:40am Questions and Answers

9:55am Overview of NIST and Management of Safety

10:15am Questions and Answers

11:05am Break

11:10am **Focus Group Discussion with Laboratory Directors**
Discussion regarding senior management's views on safety at NIST and the role and responsibilities of those throughout the chain of command

12:00pm Lunch Dining Room TBD

12:50pm **Focus Group Discussion with Division Chiefs**
Cross-section snapshot of how safety is implemented and communicated within research divisions and groups

1:30pm Discussion with Members of SHED Division

2:15pm Break

2:20pm **Focus Group Discussion with Bench Scientists, Technicians, and Division Safety**

Representatives
Discussion with a cross section of bench scientists, technicians, and division safety representatives regarding safety

3:10pm Wrap-up summary session
Opportunity for Discussion among Commissioners

3:30pm Adjournment

NIST BLUE RIBBON COMMISSION ON MANAGEMENT AND SAFETY

October 6, 2008
Boulder, Colorado

Building 1, Room 1107

Agenda

9:00am **Tour of Building 1**

Representative tour of facility concerns that contribute to safety shortcomings

9:30am **Discussion with Tom O'Brian**

10:00am **Discussion with Boulder Division Chiefs**

10:45am Break

10:50am **DOC Inspector General Investigation**

Todd Zinser, Inspector General, Department of Commerce
Presentation by IG Audit Team member preliminary findings / observations

11:05am Questions and Answers

11:15am **Overview of the Management of Safety in NIST's Construction Program**

Presentation focused on:
What NIST does to ensure contractors operate safely?
How NIST holds contractors accountable, including contract mechanisms?
What things NIST would like to do but can't do to improve contractor safety?

Stella Fiotes, Chief Facilities Management Officer, NIST

11:35am Questions and Answers

12:00pm Lunch

12:50pm **Improving Safety at NIST**

Presentation summarizes how NIST will address safety management and safety culture
Patrick Gallagher, Deputy Director, NIST

1:30pm Questions and Answers

2:20pm **Wrap up and summary; first pass at findings, and draft report approach**
Opportunity for Discussion among Commissioners

3:30pm Adjournment

Appendix 6: Individuals and Groups Interviewed

DOE Independent Review of Boulder (Gaithersburg, 9/17/08)
Thomas Staker, DOE Team Leader

NIST Deputy Director (Gaithersburg, 9/17/08, and Boulder, 10/6/08)
Patrick Gallagher, NIST Deputy Director

Operating Unit Directors (Gaithersburg, 9/17/08)
Eric Amis, Acting Director, Materials Science and Engineering Laboratory
Robert Celotta, Director, Center for Nanoscale Science and Technology
Katherine Gebbie, Director, Physics Laboratory
Howard Harary, Acting Director, Manufacturing Engineering Laboratory
Willie May, Director, Chemical Science and Technology Laboratory

Division Chiefs (Gaithersburg, 9/17/08)
Nelson Bryner, Deputy Chief, Fire Research Division,
Building and Fire Research Laboratory
Gerald Fraser, Chief, Optical Technology Division, Physics Laboratory
Marty Herman, Chief, Information Access Division, Information Technology Laboratory
Eric Lin, Chief, Polymer Division, Materials Science and Engineering Laboratory
Laurie Locascio, Chief, Biochemical Science Division, Chemical Science and
Technology Laboratory
Carl Williams, Chief, Atomic Physics Division, Physics Laboratory
David Wollman, Chief, Quantum Electrical Metrology Division, Electronics and
Electrical Engineering Laboratory

Safety, Health, and Environment Division (SHED) Staff (Gaithersburg, 9/17/08)
James Michael Blackmon, Group Leader, Environmental Compliance
David Brown, Group Leader, Health Physics, NIST Center for Neutron Research
Bruce Kelly, Industrial Hygienist, Group Leader, Safety
Timothy Mengers, Group Leader, Health Physics
Dennis Myers, Safety Specialist

Division Safety Representatives (DSRs), Bench-level Scientists, and Technicians
(Gaithersburg, 9/17/08)
Uwe Arp, DSR, Electron and Optical Physics Division
Stephen Banovic, Chief Safety Officer, Engineering Science and Engineering
Laboratory, DSR, Metrology Division
John Barker, DSR, NIST Center for Neutron Research
Michelle Donnelly, DSR, Fire Research Division
David Duewer, Analytical Chemistry Division, Chemical Science and
Technology Laboratory

Roy McLane, Engineering Technician, Building and Fire Research Laboratory
Douglas Olson, Group Leader, Chemical Science and Technology Laboratory
Jon Pratt, Manufacturing Engineering Laboratory
Sharon Ray, DSR, Plant Division
Michael Selepak, Engineering Technician
Joseph Stroscio, NIST Fellow, Center for Nanoscale Science and Technology

Director Boulder Laboratories (former) (Boulder, 10/6/08)
Thomas O'Brian, Director Boulder Laboratories (former)

Division Chiefs (Boulder, 10/6/08)
Daniel Friend, Chief, Physical and Chemical Properties Division,
Chemical Science and Technology Laboratory
Stephanie Hooker, Chief, Materials Reliability Division,
Materials Science and Engineering Laboratory
Michael Kelley, Chief, Electromagnetics Division, Electronics and
Electrical Engineering Laboratory
Kent Rochford, Chief, Optoelectronics Division, Electronics and
Electrical Engineering Laboratory
Donald Sullivan, Acting Chief, Time and Frequency Division, Physics Division
David Wollman, Chief, Quantum Electrical Metrology Division, Electronics and
Electrical Engineering Laboratory

Office of Inspector General (Boulder, 10/6/08)
Dan Buchtel, Assistant Regional Inspector General
John Bunting, Regional Inspector General
Todd Zinser, Inspector General, Department of Commerce

Overview of the Management of Safety in NIST's Construction Program (Boulder, 10/6/08)
Stella Fiotes, Chief Facilities Management Officer
Stephen Salber, Chief, Engineering, Maintenance and Support Services

U.S. DEPARTMENT OF COMMERCE

NIST BLUE RIBBON COMMISSION ON MANAGEMENT AND SAFETY

ESTABLISHMENT

The Secretary of Commerce (the Secretary), pursuant to duties imposed by law upon the Department of Commerce, including the Federal Advisory Committee Act (5 U.S.C., App.), and with the concurrence of the General Services Administration, hereby establishes the NIST Blue Ribbon Commission on Management and Safety.

OBJECTIVES AND DUTIES

The objectives and duties of the Commission shall be to investigate whether (a) the training, safety, security, and response protocols, (b) the implementation of those protocols and internal controls, and (c) the management structure at the National Institute of Standards and Technology (NIST) are appropriate to ensure the safe operation of all NIST programs.

Among other things, the Commission is encouraged to consider the relevant findings of:

- the Nuclear Regulatory Commission;
- the Department of Energy's Radiological Assistance Program;
- the NIST Ionizing Radiation Safety Committee;
- the NIST Safety, Health, and Environment Division;
- the NIST Visiting Committee on Advanced Technology;
- the five radiation and physics experts charged by the Deputy Director of NIST with providing their individual recommendations on corrective actions, avoiding future incidents, and improving safety performance and incident response; and
- the Inspector General's efforts to review the June 9, 2008 NIST plutonium incident, document lessons learned, and make recommendations accordingly; more broadly to review training, safety, and response operations at all NIST facilities; and more broadly to review NIST's management structure in terms of its ability to ensure incident preparedness and response.

The Commission shall submit oral and written reports to the Secretary on its findings.

The Commission shall function solely as an advisory body and will comply fully with the requirements of the Federal Advisory Committee Act.

MEMBERS AND CHAIRPERSON

1. The Commission shall be composed of not more than seven members appointed by the Secretary.

2. Each member shall be appointed for the duration of the Commission and will serve at the pleasure of the Secretary.

3. The Commission's membership will include qualified experts with public or private sector experience in one or more of the following areas:

- Management and organizational structure;
- Training and human resources operations;
- Laboratory management and safety;
- Hazardous materials safety;
- Emergency medical response;
- Environmental safety;
- Environmental remediation; and
- Security for hazardous materials.

4. Members shall serve as Special Government Employees (SGEs) and shall be subject to the ethical standards applicable to SGEs.

5. The Secretary shall appoint a Chair and a Vice Chair to serve in the absence of the Chair. Both members will serve in those capacities for the duration of the Commission, at the pleasure of the Secretary.

ADMINISTRATIVE PROVISIONS

1. The Commission shall begin its investigation within fourteen days of establishment. It shall provide an oral briefing of its preliminary findings to the Secretary within 45 days of beginning its investigation, and written findings within 90 days of beginning its investigation.
2. The Commission shall be under the direction of the Senior Advisor to the Deputy Secretary of Commerce (Senior Advisor), who shall serve as the Designated Federal Officer.

3. The Commission shall convene approximately three times, or at the call of the Senior Advisor, or his designee, provided that the designee is a Federal employee.

4. With the exception of support provided by the Senior Advisor, NIST shall provide funding and administrative support, including a Special Assistant, for the Commission.

5. Members of the Commission shall serve without compensation for their work on the Commission. However, while engaged in the work of the Commission, members may request travel expenses, including per diem in lieu of subsistence, as authorized by law for persons serving intermittently in government service (5 U.S.C. 5701 through 5707), consistent with the availability of funds.

6. The Senior Advisor may establish such subcommittees of Commission members as he considers necessary for the performance of the Commission's objectives and duties. The Chair, Vice Chair, and members of subcommittees shall be designated by the Secretary. Anticipated

subcommittees shall focus on: (a) training, safety, security, and response protocols; (b) implementation of protocols and internal controls; and (c) management structure. The subcommittees shall not advise the Secretary directly, but shall forward all draft and preliminary findings and work to the Commission so that it may deliberate on the matters before presenting findings to the Secretary.

7. The annual cost of operating the Commission is estimated at not more than $100,000, which includes .25 person-years of staff support.

8. The NIST Special Assistant, or her delegee, shall be responsible for filings and other applicable statutory requirements of the Federal Advisory Committee Act.

DURATION

This charter shall terminate one year from the filing of this charter with the appropriate U.S. Senate and House of Representatives Oversight Committees unless earlier terminated or renewed by proper authority.

_____ _____

Chief Financial Officer and Assistant Secretary for Administration

Date