Documentation Of Safety Issues At Los Alamos National Laboratory (LANL)

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Introduction *by Harvey Solomon*

LANL is one of the largest multidisciplinary, multi-program laboratories in the world. It is the largest institution and employer in northern New Mexico. As of 2008, the Laboratory had over 9,000 employees in addition to approximately 650 contractor personnel. As of 2004, it also had approximately 2,600 university students and guest affiliates and approximately 3,000 subcontractors personnel. As of 2008, its annual budget is approximately $2.2 billion up from $2 billion in 2004 and $ 1.1 billion in FY 1997. LANL receives most of its annual budget from the Department of Energy. The balance is comprised of Department of Defense, National Aeronautics and Space Administration and private sector research and development.

The National Nuclear Safety Administration's Los Alamos Site Office, formerly the Los Alamos Area Office (LAAO), a part of the National Nuclear Security Administration Service Center, formerly the Albuquerque Operations Office (AL) oversees contractor operations and administers site contracts. Although the University of California had managed and operated LANL since its inception in 1943 for DOE and its predecessors, on December 21, 2005, NNSA awarded Contract No. DE-AC-52-06NA25396 to Los Alamos National Security LLC, to manage and operate LANL. Los Alamos National Security, LLC includes Bechtel National Technology, the University of California, the Babcock & Wilcox Company, and Washington Group International. As of 2006, Protection Technology Los Alamos (PTLA) was the Laboratory's protective force subcontractor. In 2001, LANL awarded two subcontracts agreements BWX Technologies and Westinghouse governments Services Company for support services related to the operation of Los Alamos' major nuclear facilities.

As a DOE prime contractor, the county of Los Alamos provides 24-hour fire protection service to LANL. The Los Alamos Fire Department (LAFD) operates five strategically located county fire stations and one training facility, and staffs each fire station with three operating shifts. Fire protection services include: firefighting, emergency preparedness support, emergency medical service, light rescue, and hazardous materials response. As of 2008, LAFD operated six fire stations with 141 budgeted positions, 123 uniformed and 11 civilian ones.[1]

LANL has been a major site of research, development, and production of plutonium based nuclear weapons since the 1940s. Fission of plutonium produces massive amounts of energy but also yields an array of unstable chemical elements, which emit various forms of radiation. This radiation, above certain doses, is harmful to all living organisms. In man, it can produce serious burns, cancers and destruction of the bone marrow. When released into the environment, it contaminates air, soil and water.

1 www.globalsecurity.org/wmd/facility/los_alamos.htm

Findings *by Harvey Solomon*

Safe disposal of radioactive waste at LANL has been problematic since the early days of the laboratory. Nevertheless, safety engineers have instituted detailed procedures for disposal of radioactive materials and efficient filters to minimize the release of fine particles of plutonium and other radioactive metals into the environment.

This document, prepared by reviewing safety inspections of LANL performed by independent government agencies, characterizes the many failures, over the years, of LANL to protect both its employees and the environment from contamination by radioactivity released by the laboratory as a result of accidents and failures to follow proper procedures.

LANL has a knowledgeable staff of safety engineers who, over the years, have developed excellent policies and procedures to minimize the release of dangerous radioactivity into the environment. If these were taken seriously, the safety record at LANL would be markedly improved.

Many of these reports emphasize that the major problem at LANL in regard to contamination of the environment by radioactivity is the lack of commitment of higher management to forcefully address this important issue of safety. Moreover, in the documents reviewed, there seems to be no evidence that the managers responsible for this failed program at LANL have ever been sanctioned for their failure to meet their responsibilities to the workers at LANL and to the members of the surrounding communities.

The excerpts below that cover these issues are from publicly available oversight reports, with the source of the full documents being noted in the footnotes.

Program Weaknesses 2.2 LANL

Office of Independent Oversight & Performance Assurance, Secretary of Energy April 2002

Facilities do not have adequate procedures for some equipment and operations, and LANL management has not yet emphasized use of and adherence to procedures as an important element of ISM (Integrated Safety Management).

The implement of hazard identification, analysis, and control of programmatic work is deficient in several areas.

Important elements of an effective configuration management program are missing at CMR (Chemistry and Metallurgy Research) and RLWTF (Radioactive Liquid Waste Treatment Facility).[2]

Environmental Protection

The process weaknesses associated with this example include:

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2 Volume 1 Inspection of Environment, Safety, and Health Management at the Los Alamos National Laboratory by Office of Independent Oversight and Performance Assurance Office of the Secretary of Energy April 2002. Pages 5, 81

- Operations were resumed without formal identification of the condition's cause.
- Initial probable cause identification of the condition was not timely.
- Initial probable cause identification was not correct.
- Final probable cause identification was even less timely.
- The calculation to limit the repetitions of the direct arc spectroscopy process was not performed per the application procedure.
- Directions for limiting the number of repetitions of the process and delineating the responsibility for tracking ad documenting the process repetitions were not formally promulgated.

Program 2.2 - Program Weaknesses and Items Requiring Attention

The LANL emergency planning, preparedness, and response programs are largely expert based and, as such, do not reflect the necessary structure to support timely and accurate identification and implementation of emergency response actions. The most significant weaknesses involve the plans, procedures, systems, and tools that are intended to facilitate implementation of time-urgent response functions, and the emergency response organization (ERO-) training, drill and qualification program. The combination of the weaknesses in these two fundamental areas resulted in emergency responder decision-making demonstrated during tabletop exercises that was not sufficiently timely or accurate to have been effective in protecting workers and the public from exposure in the event of a significant hazardous material release.[3]

Weaknesses 3.0

LANL's implementation of new work control processes and corrective actions from previous assessments have not been timely and effective.

The TA-55 nuclear facilities do not always operate with the rigor and formality required for operation of a hazard category 2 nuclear facility in fundamental areas, and LASO (Los Alamos Site Office) has not provided the necessary long-term, consistent and effective oversight and stewardship to effect lasting improvements in all needed nuclear safety areas.

LANL has not established sufficient institutional drivers that require timely implementation of some of the important institutional initiatives. For example, LANL did not ensure that divisions developed adequate implementation plans and upgraded their processes and IWDs (Integrated Work Document) to fully meet IMP-300 requirements.

LANL management has not devoted sufficient attention to establishing a clear chain of responsibility and accountability for corrective actions that extends from the institutional to facility, and activity levels. In a number of cases, milestones have been missed, pre-start issues have recurred, corrective actions have been delayed or not completed, and/or corrective actions have not been verified to be effective.

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3 Volume II Inspection of Emergency Management Programs at the Los Alamos National Laboratory by Office of Independent Oversight and Performance Assurance Office of the Secretary of Energy April 2002. Page 3

LANL does not have rigorous processes for the Operational Efficiency Project Integrated Product Team Leaders to determine or verify the effectiveness of elements implemented by the divisions or by organizations within divisions.

Many of the weaknesses identified during this Independent Oversight inspection are similar to weaknesses identified by previous assessments, including the MSAs, previous Independent Oversight inspections, LASO assessments and other reviews. LANL needs to use its corrective action management processes efficiently to evaluate and prioritize the deficiencies identified during this inspection and ensure that corrective actions are coordinated with other ongoing corrective action plans. However, at the senior management level, three broad areas warrant high management priority and sustained attention:

- Clarifying the direction, expectations, and accountability for implementing IMP-300.2 and other safety management processes and improvement initiatives, including a clear chain of direction and accountability that extend from the LANL Director through various divisions and down to the individual researcher/worker.
- Establishing a systematic approach to addressing the longstanding issues with respect to nuclear safety systems, such as lack of a current documented safety analysis, supporting analysis, and technical safety requirements; such an approach would include immediate compensatory measures and developing a comprehensive documented safety analysis for TA-55.
- Enhancing and effectively implementing the corrective action management process, including clear assignment of responsibilities, accountability for performance, and effective verification of effectiveness to ensure that corrective actions are comprehensive and effective.

Appendix B Site Specific Findings

Independent Oversight, Security and Safety Performance, Secretary of Energy, November 2005

Table B-1 Site-specific findings requiring corrective action, three of twenty-six cited.

- Potential radiological hazards posed by neptunium and isotopes other than plutonium, americium, uranium, and tritium are not adequately addressed by existing LANL TA-55 [where the Plutonium Facility 4 is located] hazards analysis processes or HSR (Health, Safety and Radiation) mechanisms.
- LANL/NMT has not sufficiently defined and implemented an integrated approach to nuclear safety assessments and corrective actions that ensures that line management adequately addresses and resolves deficiencies in nuclear safety systems in a timely manner.
- LANL has not fully instituted an effective cognizant system engineering program at TA-55 ensures that system engineers are fully knowledgeable about the technical details/bases of their systems, including the authorization bases, interaction with supporting control systems, technical manuals and associated system performance criteria and supporting calculations. [4]

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4 Inspection of Environment, Safety, and Health Programs at the Los Alamos National Laboratory Office of Independent Oversight Office of Security and Safety Performance Office of the Secretary of Energy November 2005. Pages 5, 6, 16, 18

Weaknesses 3.

Independent Oversight Office of Health, Safety and Security, Secretary of Energy January 2008

The LANL integrated work management process does not provide adequate guidance and requirements to ensure that all activity-level hazards are fully analyzed and effective controls developed. IMP-300.4 and other institutional work management documents such as the LANL Conduct of Operations Manual contain several weaknesses or deficiencies that significantly contribute to implementation problems observed during both this and the 2005 Independent Oversight inspection. First, the IMP-300.4 process has not been integrated with conduct of operations. Although technical procedures are the primary administrative control in routine operations and preventative maintenance activities involving moderate or high hazards, neither the LANL Conduct of Operations Manual nor the integrated work management process provides adequate guidance or requirements on expectations for integration of job hazard assessments and integrated work documents (IWDs). Next, although the IMP -300.4 process is being used for research activities, there is minimal guidance in development for over nine months, but progress toward approval has been slow. Other deficiencies include inadequate criteria in the hazard grading matrix, no quantitative or qualitative triggers for ES&H (Environment, Safety and Health) subject matter, expert involvement for moderate hazard activities, and inadequate guidance for standing IWDs or IWDs for long duration activities. The new IMP-300.5 procedure provides some improvements in work control but does not adequately address most of the weaknesses in work control process that were identified during this Independent Oversight inspection.

Weaknesses in implementation of work planning processes have resulted in ineffective analysis of hazards and incomplete specification of controls for some work activities, by all of the organizations that were reviewed. Notwithstanding the institutional concerns about IMP-300.4, expectations are clearly defined that require systematic analysis of hazards and linkage to specific controls. In a number of examples, such as use of the job hazard assessment tool or equivalent processes, are sometimes not followed, and hazard grading criteria are not always properly or conservatively applied, resulting in lack of a requirement subject matter expert involvement in work planning. As a result, hazards are not always properly identified and analyzed, and controls for work activities sometimes lack technical justification and are poorly defined or inadequate. For R&D and fabrication shop activities conducted within Chemistry and Threat Reduction, some work activities are not sufficiently defined in IWDs such that hazards and controls can be readily identified, particularly for work performed infrequently or for complex R&D activities. Exposure assessments have not been performed for a number of activities, and some hazard controls have not been communicated or effectively implemented. For maintenance activities, although progress has been made, there are continuing deficiencies in the area of work planning, where hazards are not always identified and analyzed, and applicable controls are not always established in work control documents. Additional deficiencies were found in the area of work performance, where workers do not always follow IWD requirements and persons in charge do not ensure compliance.

Several institutional safety and health programs lack sufficient policies, and/or training requirements to ensure that hazards are adequately controlled. LANL does not have sufficient procedures, policies, and training of workers with respect to use of hydrofluoric acid and when working with nanomaterials. Chemical fume hood procedures, testing, and user training do not have sufficient rigor to ensure that chemical fume hoods provide the level of worker protection

that is assumed by line management. The LANL hazard communication and cryogen programs do not have sufficient definition in some areas to be effectively and consistently implemented, particularly with respect to inclusion of some commonly used hazardous chemicals and the calculation of the potential for oxygen-deficient atmospheres when using cryogens.

LANL senior management has not ensured sufficient rigor in enforcing safety requirements at RLWTF (Radioactive Liquid Waste Treatment Facility) and has not ensured that facility conditions and operations at RLWTF comply with environmental regulations, institutional safety and conduct of operations requirements, and assumptions and initial conditions of the facility safety basis. In the most significant example, LANL senior management has allowed the liquid waste collection system to degrade to a condition where: (1) based on Independent Oversight's review of a 2004 LANL engineering review and current system status, the integrity of the stainless steel and carbon steel portions of the primary piping is severely degraded and the secondary containment barrier between the system and the environment is not intact; (2) 23 of 65 of the secondary collection sumps contain liquid levels in excess of the leak detection alarm set points; (3) 9 of 23 vaults with water have not been analyzed to determine whether the water is due to a primary leak (LANL reports the other 14 have now been analyzed and determined to contain rainwater and not water from a primary leak); and (4) the leak detection alarm system is no longer capable of detecting a primary leak because of the water inventory and other deficiencies. Under these conditions, an undetected leak in the primary collection line releasing to the environment through faults in the secondary containment vaults cannot be precluded. Additionally, even if all sumps are later determined not to contain radioactive liquids, the current condition of the system is not capable of detecting a future leak. In another example, a room in the RLWTF has been used as a storage area for diesel fuel and waste oil for months. However, the RLWTF safety analysis report never analyzed that room as a fuel storage area and never considered that amount of combustible fuel in the room. Management did not perform an analysis (an un-reviewed safety question determination) to ensure that using the room as a fuel storage area met the assumptions of the safety analysis. Several other deficiencies in material conditions and conduct of operations further indicate that significantly increased senior management attention is needed to improve the safety of RLWTF operations.

LANL's approach to safety basis improvements has not sufficiently focused on engineering design weaknesses and on identifying, prioritizing and addressing potential technical vulnerabilities in essential safety systems.

Although progress has been made since the 2005 Independent oversight inspection, LANL has not fully developed and rigorously implemented an effective contractor assurance system. The roll out of the new and revised assurance system processes were not performed with sufficient controls and monitoring to ensure that requirements were adequately communicated, or those organizations were implementing the processes effectively.

Little progress has been made in addressing weaknesses and deficiencies in occupational injury and illness management and operational experience/lessons learned programs since 2005.

Conclusions

Inspection of Environment, Safety, and Health Programs at the LANL by Office of Independent Oversight Office of Health, Safety and Security Office of the Secretary of Energy January 2008

With a few exceptions, (e.g. the LASO employee concerns program), NNSA and LASO have made little progress in addressing the longstanding deficiencies in their oversight programs. The same problems identified in 2005 by Independent Oversight and by various other inspections and reviews are still evident. Further, NNSA and LASO do not have a realistic strategic plan for addressing the systematic deficiencies in their processes and oversight programs. The deficiencies in NNSA and LASO oversight are contributing to the continued weakness in LANL ES & H programs.

LANL has made progress in a number of areas, but deficiencies are still evident in many aspects of LANL ES&H and safety management programs and processes. LANL recognizes the need for changes in the safety culture and has made management and organizational changes (e.g., Facility Operations Directors) to promote such change. LANL management has also demonstrated a willingness to set aside priorities to address safety issues (e.g., facility stand downs and outages). Through such efforts, LANL is making progress in enhancing safety at LANL in a number of areas (e.g., nuclear safety improvements at TA-55; new initiatives in work planning control, and feedback and improvement; and effective elemental management and pollution prevention).

The identified deficiencies in essential safety system functionality demonstrate that nuclear safety is still a concern that warrants increased management attention and timely additional actions. Priority attention is needed to address the significant technical design issues that have not been adequately resolved since the 2005 Independent Oversight assessment. There are continuing weaknesses in nuclear safety processes and the institutional processes and procedures for analyzing and reporting potential concerns about the safety bases. Further, Independent Oversight's review of the WETF-a typical LANL nuclear facility that has not had the benefit of the increased management attention and pilot programs-revealed deficiencies in the safety system designs and their translation into procedures, procurement and operations. When identified during this Independent Oversight inspection, these deficiencies prompted LANL to place the tritium gas confinement system in a safe mode (i.e., warm standby). Deficiencies in nuclear safety bases at RLWTF and site-specific administrative controls were also noted. [5]

N. B. by Harvey Solomon

The footnote cited contains an unusual comment on how concerned the managers of LANL are with the deficiencies reported and how totally they are committed to improvement. This is not an appropriate inclusion in the document as the purpose of an inspection is to report facts and make conclusions. It should not be the place to comment on promises.

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5 Inspection of Environment, Safety, and Health Programs at the Los Alamos National Laboratory Office of Environment, Safety and Health Evaluations Office of Independent Oversight Office of Health, Safety and Security Office of the Secretary of Energy January 2008

Los Alamos National Laboratory; Information on Security of Classified Data, Nuclear Material Controls, Nuclear and Worker Safety and Project Management Weaknesses[6]

GAO Report January 10, 2008

Although the Inspector General concluded that, in general, LANL provides timely and accurate information on its inventory of accountable nuclear material, it highlighted several areas of concern including the following:

Several inventories of nuclear materials were not completed in a timely manner.

A storage vault containing over 11,00 individual containers of accountable nuclear had not undergone a 100 percent inventory in over a decade.

The creation of a new container of accountable nuclear material was not documented within the required time frame. This nuclear material could have been diverted without any record showing that it had ever existed.

Concerns about nuclear safety at LANL are long-standing. Problems include the following:

Criticality concerns[7].

For example, since 2003 the laboratory reported 19 incidents raising nuclear criticality concerns, such as storage or transportation of dangerous material in quantities that exceeded or potentially exceeded criticality limits. In the plutonium facility (TA-55) in July 20007, for example, an area of the facility containing spent trichloroethylene exceeded criticality safety limit for such material by 40 percent. As recently as September 2007, operations were suspended in the plutonium facility over nuclear safety concerns.

Radiological exposures.

Since fiscal year 2003, the laboratory reported 21 incidents involving exposure to radiological materials, including contamination of face, hands or other body parts from working in situations such as glove boxes, unusually high, unexplained dosage readings for workers; and unanticipated intake of contaminants, such as plutonium, from inadvertent release.

Nuclear safety violation enforcement actions.

Since fiscal year 2003, LANL has received four enforcement actions containing civil penalties totaling nearly $2.5 million for significant violations of nuclear safety requirements. The enforcement actions include a June 2004 penalty of $770,000 for violations that resulted in two workers being exposed to radiation doses exceeding annual allowable limits, and a February

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6 GAO-08-173R: Los Alamos Laboratory January 10, 2008. Page 4

7 Criticality involves an inadvertent nuclear chain reaction. To prevent such an occurrence from happening, DOE's regulations and directives require contractors to evaluate potential accident conditions and put in place appropriate controls and safety measures.

2007 penalty of $1.1 million for 15 separate violations of nuclear safety rules, reflecting continuing safety performance deficiencies over the past several years.

From October 1, 2002 through June 30, 2007, LANL experienced 23 reported safety accidents serious enough to warrant investigation. Although no fatalities occurred during this period, workers involved in these accidents were seriously injured.[8]

Examples of safety accidents include the following:

> A package in which plutonium-238 residues had been stored since 1996 degraded and ruptured when being handled, releasing airborne plutonium. Two workers were each exposed to about one-half of DOE's annual allowable radiation dose for occupationally exposed workers (August 2003).
>
> A student was partially blinded after receiving a laser flash to her eye during an experiment because a LANL researcher in charge failed to ensure that the student was wearing required eye protection (July 2004).
>
> After opening a package of radioactive material contaminated during shipping, a LANL employee contaminated himself and his clothing. Over the next few days, the worker spread contamination to his home, to relatives' homes in Kansas, Colorado, and to other sites at LANL. The contamination went undetected for 11 days.
>
> Laboratory workers were exposed to plutonium on two occasions while performing routine operations inside protective glove boxes that contained sharp tools (January 2007).

DOE Annual Report on Nuclear Criticality Safety Programs 2009[9]

Summary Response:

LANL
An increase in non-compliances occurred. There were 13 total non-compliances nine of which were infractions. Four of these involved partial loss of a process parameter with two or more parameters providing criticality safety margin. Two resulted from legacy issues. Several non-compliances were judged to result from operator confusion due to extensive re-work of postings and administrative controls that occurred from the Augmented Limit Review process.

Defense Nuclear Facilities Safety Board[10]

LANL Los Alamos Report for Week ending March 20, 2009

Plutonium Facility: Based on questions from a NNSA site office facility representative concerning a temporary modification, LANL declared a Technical Safety Requirement (TSR) violation this week associated with the lack of an alarming oxygen monitor for a particular glove

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8 For further information on worker safety at LANL, see GAO, Nuclear and Worker Safety: Actions Needed to Determine the Effectiveness of Safety Improvement Efforts at NNSA's Weapons laboratories, GAO-08-73 9 Washington, D.C.:Oct. 31, 2007).

9 DOE Annual Report on Nuclear Criticality Safety Programs 2009

10 Los Alamos Report for Week ending March 20, 2009

box. A Plutonium Facility Specific Administrative Control (SAC) requires use of an oxygen monitor that is calibrated quarterly to ensure local alarm response occurs at less than or equal 5%. This requirement only applies for "potentially pyrophoric processes (plutonium machining/hydriding)' and is intended to reduce the likelihood of a glove box fire. For the glove box in question, an oxygen monitor was installed as a temporary modification (the primary monitor was out of service); however, the temporary unit did not provide the local alarm feature. The temporary modification was evaluated under the Unreviewed Safety Question process but two qualified analysts failed to recognize the potential safety basis impact of this modification. Although specific operations in the glove box did not involve potentially pyrophoric processes, facility management conservatively declared a TSR violation based on a lack of any controls to prevent such operations from being performed.

LANL Worker Safety During Programmatic and Research Operations

Memorandum January 20, 2010[11]

The National Nuclear Security Administration (NNSA) is concerned about recent safety incidents that have a programmatic or conduct of-research nexus. These events are similar to each other and to prior events, indicating that prior corrective actions have not been fully effective or have degraded with time. Without appropriate management focus, evaluation, and response, these could become precursors to incidents of even greater significance, up to and including serious injuries or fatalities.

Relevant recent events include but are not limited to the following:

January 9-10, 2010
A rapid energetic reaction occurred in an oven during the weekend in Technical Area (TA) 48. The experiment was set up by a postdoctoral assistant working under the direction of a mentor to duplicate an experiment described in a published paper; however, the researcher was using higher constituent concentrations and a pressure vessel instead of glassware. The work was done to a "generic" integrated work document (IWD). While the work had been reviewed by a mentor, there was no formal work release. The relevant material safety data sheets indicated there were unidentified hazards that a more formal hazard review and work release, as intended by the IWD process would likely have discovered;

December 16, 2009
The large-bore powder gun at TA-15 failed in a manner that caused extensive damage to equipment and the building but no injuries;

July 24, 2009
A TA-53 researcher received an extremity dose higher than anticipated while handling a TA-48 target with elevated beta dose rates;

July 23, 2009
An eructation occurred at TA-35-213 when a technician disposed of a caustic-acid mixture in a carboy. This led to an evacuation of several facilities;

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11 Worker Safety During Programmatic and Research Operations FO:19CK-227050 LANL Memorandum

July 5, 2009
An energetic reaction occurred in an occupied room in TA-35-2 after a student erroneously disposed of acetone into a sealed acid waste container. A secondary reaction resulted in a brown cloud that caused responders in the room to evacuate; and

March 20, 2009
An employee received a 3,500 VDC shock when he inadvertently contacted the high voltage end of a battery string from a trainer fire-set.

Accident investigations for some of these events have lagged and have been under-scoped. While the two TA-35 events occurred in July 2009, the investigation report was only recently finalized, nearly six months later. The TA-54 powder gun failure event is being appropriately investigated now, but the initial investigation team composition appears to have been inadequate. Following the most recent event (TA-48), Los Alamos National Security, LLC (LANS) personnel cleaned up the scene before formal investigation, LANS management discouraged a formal critique, and LANS did not aggressively pursue whether the event constituted a repeat occurrence considering other similar events, such as the TA-35 events.

The lag in accident investigations also leads to a lag in identification and implementation of corrective actions and delay in improving the safety of research and programmatic operations. These events are also strikingly similar to prior events, such as:

June 7, 2005
Two postdoctoral assistants at TA-48 inhaled acid vapors while cleaning glassware on a bench-top instead of in a hood;

May 27, 2005
An explosion occurred in TA-9 while researchers were attempting to scale up a chemical process described in a published article. Both a postdoctoral assistant and a student received facial lacerations and other injuries;

July 14, 2004
A student sustained severe eye injury while working with a laser;

July 23, 2003
A post-doctoral assistant performing a column separation accidentally sprayed acid into his eyes. Subsequently, the same person received a skin contamination;

April 4, 2003
An unanticipated flash resulted in severe burns to a TA-9 researcher who was in the process of removing a formulation from a Petri dish; and

January 8, 2002
An explosion occurred in TA-54-1009, after researchers synthesizing liquid chlorine dioxide, increased the chlorine concentration from 4% to 100%. Serious injuries were avoided, only by the researchers recognizing a rapid temperature rise and immediately evacuating seconds before the explosion occurred.

Each of these earlier events represents hard lessons learned that culminated in the site's current integrated work control process. However, the commonalities between recent and earlier events indicate that the organizational learning and the sustained focus on improvement necessary for a proactive safety culture have not been embraced across this site. Reference (LANL Procedure

P300, “Integrated Work Management”, Revision 1, October 30, 2009.) is still not adequately and sustainably implemented for some programmatic and research activities. Prior corrective actions have exhibited a “half-life” and will not be sustained without continuous management vigilance.

Active and aggressive management of event investigations, corrective actions, and effective reviews of do not appear to be occurring. Management commitment to improving the safety of research and programmatic operations is not universally evident across the site. Operational excellence is just as important in research under the scientific method as it is in other areas.

As evidenced by the above incidents, achieving mature, sustainable work control implementation has lagged in research and development and in other programmatic work.

NNSA has not seen a consistent senior management emphasis on addressing these issues. The Defense nuclear Facilities Safety board (DNFSB) made similar observations.[12] Los Alamos Site Office (LASO) also expects LAN's response to address all aspects of work control, with special focus on programmatic, and research and development work.

Project on Government oversight (POGO) letter to President Obama regarding Systemic Safety Issues At Los Alamos National Laboratory[13]

February 11, 2010 letter

The safety incidents (at LANL) don't end with those cited in the memo of January 2010. The Defense Nuclear Facilities Safety Board has identified other recent safety fiascos at Los Alamos, such as the faulty fire suppression system at the plutonium facility, and previously undisclosed studies that the public could be exposed to thousands of rem in the event of an earthquake and resultant fire at TA-55 because of adequate safety systems are not in place. (We are pleased to learn that Secretary Chu has sought to address this last problem and to reduce the risk of catastrophic release at TA-55).

This long history of unimproved safety performance indicates that Los Alamos is not being held accountable for its repeated safety failings. There is an obvious and effective solution to get Los Alamos to address these failings: DOE should use its power of the purse by withholding a significant portion of the approximately $70 million per year Los Alamos receives in contract award fees until its safety record markedly improves. Because of NNSA's recent decision to withhold all of the nuclear weapons labs' annual Performance Evaluation Plans (PEPs) and Performance Evaluation Reports (PERs), we are not able to determine whether DOE took such action in 2009. Yet given our review of past PEPs and PERs which did not show significant award fee reductions for safety, as well as the continued safety problems at Los Alamos, it is clear that NNSA has not been strong enough in holding Los Alamos accountable for its mistakes. One of the reasons PEPS and PERs should not be obscured from public view is because they are important for determining how NNSA holds the labs accountable for their management issues, something we don't believe is happening in light of this memo. Delaying the release of PEPs and PERs is not the only recent DOE decision that threatens public and federal oversight of nuclear weapon labs. NNSA has placed a six-month moratorium on NNSA-initiated functional

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12 DNFSD Letter from John E. Mansfield, DNFSB to Thomas D'Agostino NNSA-HQ dated December 2, 2009

13 http://www.pogo.org/pogo-files/letters/nuclear-security-safety/nss-nwc-20100211.html

assessments, reviews, evaluations and inspections. In addition, the Office of health, Safety, and Security (HSS), DOE's independent oversight body has not scheduled any Oversight Inspections for 2010.

It is clear that now is not the time to experiment with models that reduce government oversight: NNSA should reverse its decisions to withhold PEPS and PERS; and to initiate an oversight moratorium. The HHS should also immediately schedule an inspection at Los Alamos.

In addition, the clear systemic management problems at Los Alamos require oversight and accountability, and we ask that you designate a White House-level staff person to ensure that these problems at Los Alamos and the other nuclear weapons labs are not allowed to persist.

Defense Board Catches Los Alamos Trying to Dodge Plutonium Safety Vulnerability. *Peter Stockton POGO Project on Government Oversight October 27, 2009*

Project on Government Oversight (POGO) has learned from sources that the Department of Energy (DOE) has been scrambling to delay a Defense Nuclear Facilities Safety Board (DNFSB) report about a potential major threat to public safety posed by plutonium at LANL. The Department was rushing to begin addressing the safety vulnerability and to release its own public statement before the DNFSB made its report public. DOE is reacting to the DNFDB's report, which was posted on its website this morning to energy Secretary Chu about a safety vulnerability involving over 10,000 pounds of plutonium housed in LANL's Technical Area-55 (TA-55).

The vulnerability, safety controls that are insufficient to mitigate the release of plutonium to the public, have long been known and unaddressed by DOE at LANL. Years ago , LANL safety analysts determined that the building at TA-55 is so "leak" that it could not prevent plutonium from being accidentally released. Last year, however, LANL safety analysts further calculated that in the event of an earthquake and resultant fire , a very real threat , as LANL sits on top of a fault line-the dose to the public from the TA-55 plutonium facility could be over 100 times the acceptable level.

Current safety regulations require that safety controls be put in place if dosed to the public approach 25 rem. Yet, a year later, DOE and LANL have done nothing in response to the analysts' findings that more than 2500 rem could be released in the event of an earthquake and resultant fire, Instead, DOE allowed LANL to avoid dealing with this public risk by saying the government will accept the risk without forcing the contractor to impose additional safety controls ro protect public health. That is, until the DNFSB put DOE on notice that it is about to make the problem public. The same vulnerabilities exist at other facilities at LANL, including waste site TA-54 Area G which holds 3,500 pounds of plutonium.

In the face of DNFSB's public revelation of the vulnerability at TA-55, only now is DOE considering removing significant amounts of plutonium from that facility to other DOE weapons facilities. Sources tell POGO that DOE also plans to inform Congress and OMB about this problem this week.

"This is just the most recent example of DOE not only failing to address a safety or security vulnerability, but also attempting to withhold bad news from top management, Congress, and the public" said POGO Senior Investigator Peter Stockton. "This time, though. The Department isn't getting away with it, and now is in full spin-control mode.[14]

Harvey Solomon comment:
What follows is, to date, a description of the most devious, diabolical and dangerous scheme yet devised by LANL and the DOE to prevent any information concerning unsafe conditions at the laboratory and the failure of its management to take corrective action even in the case of near criticality incidents. This information is taken from a GAO report to The Honorable John D. Dingell, Chairman, Committee on Energy and Commerce, House of Representatives released on

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14 Peter Stockton Project on Government Oversight October 27, 2009 at http://www.pogo.org/pogo-files/alerts/nuclear-security-safety/nss-lanl-20091027.html

23 October 2008. The proposal is so antithetical to all accepted practices in regard to independent inspections of industries dealing with highly dangerous materials that it is highly likely it is based on concerns designed to meet economic and/or political goals rather than to protect the environment and the public. In effect, DOE would do away with independent safety inspections of LANL and replace them by infrequent inspections performed by a self serving group within the Agency which has no training, no interest, and no desire to continue to expose the wretched safety conditions which exist at the Laboratory. These are very likely to become even more serious. As an added effort to liberate the management of the laboratory from any responsibility for serious nuclear incidents which might occur, the reports produced by the compromised inspectors would not be open to the public. Such documents do not contain any information which is vital to the safety and security of the nation and have been public records for over twenty years. The only possible reason to sequester them is to hide their highly critical evaluations of LANL from the public.

Nuclear Safety, Department of Energy Needs to Strengthen Its Independent Oversight of Nuclear Facilities and Operations. [15]

GAO-09-61 October 2008 Report to Congressional Requesters

The Congress gave DOE and its predecessor organizations the authority to regulate nuclear safety when they were formed, while the Nuclear Regulatory Commission (NRC) regulates virtually all other federal nuclear facilities and all commercial, industrial academic and medical users of nuclear materials. The Congress gave DOE and its predecessor organizations the authority to regulate nuclear safety when they were formed. DOE self regulation, however, creates a potential conflict of interest between meeting the mission objectives of the department while at the same time ensuring the proper independent emphasis on safety. This potential conflict was highlighted in a 2004 recommendation of the Defense Nuclear Facilities Safety Board (Safety Board) to DOE on ways to improve oversight of complex, high-hazard nuclear operations.[16] The Safety Board noted that the possibility of a nuclear accident at a DOE facility was growing, in part because there was increased emphasis on productivity at the possible expense of safety and that there had been a reduction in central oversight of safety. The Safety Board pointed out that despite a long and successful history of nuclear operations at DOE-during which DOE developed a structure and requirements to achieve nuclear safety—the Safety Board determined the need to recommend changes including increased central oversight of nuclear safety by the program offices at headquarters.[17] In addition, we reported in October 2007 on three DOE weapons laboratories with records of recurring accidents and violations of nuclear

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15 GAO-09-61 October 2008 Report to Congressional Requesters. Nuclear Safety Department of Energy Needs to Strengthen Its independent Oversight of Nuclear Facilities and Operations

16 Defense Nuclear Facilities Safety Board, Recommendation 2004-1, Oversight of Complex High-Hazard Nuclear Operations, May 21, 2004. The board was established by the National Defense Authorization Act, Fiscal Year 1989 (Pub.L. No. 100-456, September 29, 1988.

17 The program offices with nuclear facilities at sites that they oversee are the Office of Environmental Management, Office of Nuclear Energy, Office of Science, and the National Nuclear Security Administration (a semi-autonomous agency within the DOE).

safety requirements.[18] We found that these events stemmed largely from lax implementation of safety procedures, weakness in identifying and correcting safety problems and inadequate oversight. There are 15 other DOE sites that have high-hazard nuclear facilities, including two nuclear research reactors and other nuclear facilities for waste management, research and weapons development.[19]

We have reported on the need for effective independent, oversight of nuclear safety across the DOE complex, finding that a strong management and oversight program is needed to assure that DOE's nuclear operations are carried out in a safe and environmentally acceptable manner. Starting in 1977, we argued for creating and strengthening an independent oversight office within DOE and its predecessor organization , the Energy Research and Development Administration.[20] Notwithstanding our support for this office, we found internal oversight alone was not sufficient to provide a fully independent review process. In a 1986 report, we recommended that an external organization also review the safety basis for each new DOE nuclear facility, and we supported the establishment of the Safety Board.[21] Even with the advisory oversight provided by the Safety Board, in the mid 1990s , the Congress considered legislation to externally regulate nuclear safety at DOE facilities and held hearings on this issue. Although no legislation was enacted, DOE responded by creating advisory committees to help formulate its position and to assess the benefits and costs of shifting away from self-regulation.

In considering legislation to establish the Safety Board in 1987 the GAO identified some key elements that should be possessed by any nuclear safety oversight organization in order for it to provide effective independent oversight.[22] These elements were based on a long history of reviewing nuclear safety at DOE and supporting independent oversight. These elements have been updated primarily through the addition of enforcement and have also been discussed with outside nuclear safety experts. They are as follows:

• **Independence:** The organization should be structurally distinct and seperate from DOE program offices to avoid management interference or conflict between program office mission objectives and safety.

• **Technical Expertise:** The organization should have sufficient staff with the expertise to perform sound safety assessments.

• **Ability To Perform Reviews And Require That Findings Be Addressed:** The organization should have the working the working knowledge necessary to review a facility's compliance with

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18 GAO, Nuclear and worker Safety: Actions needed to Determine the Effectiveness of Safety Improvement Efforts at NNSA's weapons Laboratories, GAO-08-73 (Washington, D.C.: Oct. 31, 2007)

19 Doe regulations (10 CFR part 830, appendix A to subpartB) define three categories of high-hazard nuclear facilities according to their potential to produce significant radiological consequences from an event that could either extend beyond the boundaries of a DOE site, remain within the boundaries of a site , or remain within the immediate vicinity of a nuclear facility.

20 GAO, An Unclassified Digest of a Classified Report Entitled “Commercial Nuclear Fuel Facilities Need Better Security GAO-EMD-77-40a (Washington, D.C. : May 2, 1977).

21 GAO, Nuclear Safety: Safety analysis Reviews for DOE's Defense Facilities Can Be Improved GAO-RCED-86-175 9washington, D.C.: June 16, 1986).

22 GAO, Key elements of Effective Independent oversight of DOE's Nuclear Facilities, GAO/T-RCED-88-6(Washington, D.C. : Oct. 22, 1987)

nuclear safety requirements. Developed through periodic reviews and it should also have sufficient authority to require the program offices to effectively address its review findings and recommendations.

• **Enforced Authority:** The organization should have sufficient authority to achieve compliance with DOE nuclear safety requirements.

• **Public Access:** The organization should provide public access to its reports so that those most affected by operations can get facility information.

It comes as no surprise in light of the dreadful safety conditions at many of DOE's nuclear facilities, their documented history of resistance to making corrective actions and their primary emphasis on production over safety that they should aggressively resist all of these reasonable recommendations. The DOE is proposing that HSS (Office of Health, Safety, and Security) replace all other forms of recommended independent safety inspections of its nuclear facilities. Among its current functions, HSS is responsible for periodic appraisals of the environment, safety and health programs at DOE sites, including evaluation of a sample oh high-hazard nuclear facilities at these sites to determine if program officers and their contractors are complying with DOE policies. DOE claims that HHS "is the only office within DOE that oversees these programs without influence from the program offices, thus avoiding the potential conflict of interest inherent with program office oversight and helping to ensure public confidence in the department's ability to self-regulate nuclear safety." Despite these claims by DOE the GAO identified the following serious deficiencies when it reviewed the performance of the HSS:

• **HSS Falls Short Of Fully Meeting Our Five Elements Of Effective Independent Oversight Of Nuclear Safety**

• **HSS Has No Role In Reviewing The Safety Basis For New Nuclear Facilities, No Routine Site Presence, And Its Head Lacks A Rank Comparable To Program Office Heads.**

• **HSS Does Not Have Some Technical Expertise In Nuclear Safety Review And Has Vacancies In Critical Nuclear Safety Positions.**

• **HSS Lacks Basic Information About Nuclear Facilities, Has Gaps In Its Site Inspection Schedule, And Does Not Routinely Ensure That Its Findings Are Effectively Addressed.**

• **HSS Has Authority To Enforce Nuclear Safety Requirements, But Its Actions Have Not Prevented Some Recurring Nuclear Safety Violations.**

This DOE proposal is a florid example of the lack of critical thinking that exists within the "institutional mentality" of the organization. It is a regressive concept that would ensure a rapid and more generalized increase in unsafe practices involving highly hazardous radioactive materials. It appears only to benefit the managers of DOE's nuclear facilities by further encouraging them to operate their institutions as rogue laboratories. Moreover it displays a massive contempt for the environment and the individuals who unfortunately live in the vicinity of these potential ovens of nuclear criticality.

Conclusion

Harvey Solomon Comment

Although LANL sits in splendid isolation on the Pajarito Plateau, for over a decade there have been recurrent, in-depth reports of serious safety violations by inspectors from the Office of Independent Oversight and Performance Assurance, which reports to the Office of the Secretary of Energy and by the United States Government Accountability Office (GAO). Many of these serious safety violations, including near criticality events, have never been adequately addressed by the Laboratory. Several investigations have suggested that these failures are directly linked to an unwillingness of higher management to commit to establishing an effective, responsive safety program. LANL, unlike facilities regulated by the Nuclear Regulatory Agency (NRC), is regulated by the (DOE) Department of Energy and as such "self-regulation may create a potential conflict of interest between meeting the mission objectives of the DOE while at the same time ensuring the proper emphasis on safety." Moreover, the culture of secrecy at LANL, its relative lack of communication with its neighbors and its frequent claim that "its responsibilities end at its fences" has led to a climate of distrust and suspicion of the Laboratory in the surrounding area of northern NM. The proximity of the cites of Santa Fe, Espanola and the pueblos of Santa Clara, San Ildefonso, Ohkay Owingeh, Pojaque , Nambé and Tesuque to LANL poses a serious threat to the lives of over 160,00 people should a serious nuclear incident occur at the Laboratory. Ongoing independent inspections of LANL must continue and commitment to a responsible safety plan that protects both workers at the Laboratory and the peoples of the surrounding communities is long overdue. It is mandatory that no major changes be made in the current program of independent safety inspections and that the results of all these inspections of safety issues at LANL continue to be made available to the public. This information is the only creditable documentation of the potentially dangerous effects LANL may have on the environment and people of northern NM. Without it, we are at serious risk from a laboratory which has a long standing history of lack of commitment to safe operating practices and of depending, primarily, on the statements of uninformed public relations officers to present highly distorted reports on the real conditions existing at the laboratory.