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U.S. DEPARTMENT OF ENEGY

PRESENTED AT THE
DEFENSE NUCLEAR FACILITIES SAFETY BOARD
PUBLIC MEETING ON SAFETY IN DESIGN

FOR RELEASE ON DELIVERY
Wednesday, July 19, 2006

Good morning Mr. Chairman, members of the Board and staff. I am pleased to be here to discuss project management in the Department of Energy (DOE). At your request, I will discuss the results of Office of Inspector General (OIG) findings related to the general area of project management within the Department. While safety is the focus of the Board and this hearing, effective project management policies, procedures and practices are vital to ensuring that the Department's safety requirements are incorporated into the design and execution of every major project.

As you are aware, the Department undertakes complex multi-million dollar construction and operation projects, many of which are unique in the world. The delivery of these projects within cost, scope and schedule affects the Department's ability to carry out its missions, including nuclear security, environmental quality, science, and energy resources. Accordingly, it is paramount that the Department employs sound project management principles.

Since June 2001, the Office of Inspector General has conducted a number of audits and inspections of the Department's major projects. For example, my office has reviewed environmental; construction; and, weapons refurbishment projects.

We have focused these reviews on determining whether the Department's project management policies, procedures and practices were effective in completing the projects within established scope, cost and schedule baselines. Our work has disclosed that the Department did not always:

- Fully evaluate alternatives and define project end products;
- Develop realistic performance baselines, and follow established change control procedures;
- Prepare and update project execution plans;
- Fully analyze and mitigate project risks; and,
- Establish adequate contingency plans.

To varying degrees, these problem areas existed across Departmental program organizations. Consequently, we have reported Project Management as a Departmental Challenge since 1999.

Despite the observed problems discussed previously, the Department has made progress in establishing a disciplined approach to project management. For example, the Department has established project management policies and procedures to guide the acquisition of capital assets, initiated a career development program for project managers, and established a standard project assessment and reporting system.

Although others on the panel are in a better position to describe these changes, we have observed that the Department continues to refine its policies and procedures to provide increased emphasis on certain areas of project management, including safety. For example, the Department is currently developing a new technical standard on integrating safety into design and construction that will provide more details on the development of nuclear safety basis documentation required for each critical decision point in a project.

While progress has been significant, effective and consistent implementation of project management policies and procedures is a major challenge facing the Department. To ensure that future projects do not encounter problems similar to those described previously, the Department needs to continue its efforts to:

1. Ensure managers are assigned early in the projects and have sufficient authority and training to carry out their project management responsibilities and are held accountable for meeting cost, schedule, and performance baselines;
2. Ensure budget planning and execution is consistent with approved project baselines; and
3. Improve contract administration to incentivize contractor performance and to enforce contractor accountability for sound project management practices.

These suggestions for improving implementation of the Department's project management policies and procedures are consistent with the Secretary's August 2005 memorandum outlining a plan to improve project management, as well as, observations made by the National Research Council and the Civil Engineering Research Foundation.

Mr. Chairman, this completes my prepared statement and I welcome follow-up questions.

Statement for the Deputy Administrator of Defense Programs,
National Nuclear Security Administration, to the
Defense Nuclear Facilities Safety Board
July 19,2006 Public Meeting - Safety in Design

Mr. Chairman and Members of the Defense Nuclear Facilities Safety Board:

Thank you for the opportunity to speak to you this morning on behalf of Ambassador Brooks about how the National Nuclear Security Administration (NNSA) integrates nuclear safety into our projects. The focus of my discussion will be on results, to date, of NNSA's actions taken to integrate safety in design and construction outlined in the February 6, 2006, Linton Brooks Memorandum, *Implementing Actions and Schedules for Integrating Safety into Design and Construction.* I will also discuss how NNSA intends to "institutionalize" the design processes and products needed to successfully reduce the risk of developing additional safety-related design issues during the facility life-cycle.

The implementation actions being taken by NNSA to adequately identify and resolve safety issues early in the design cycle of construction projects are very similar to the actions specified in the Environmental Management plan.

As the Deputy Secretary and Jerry Paul, who was then acting for Ambassador Brooks, stated at the December 2005 public meeting, NNSA is aware of the importance of integrating nuclear safety and project management and we firmly understand that safety is more than a priority-it is a core value of the Department. In particular, we understand the importance of:

- Integrating safety early in the design and the subsequent implementation of the design during the construction and startup of the facility recognizing that safety analysis and design development progress together in an iterative process;

- Defining the complete set of safety requirements early in a project's life cycle and then maintaining configuration control through design, construction, operation, and even, ultimately, to decommissioning; and

- Establishing an appropriate safety strategy, which includes identification of safety class and safety significant structures, systems, and components for nuclear projects, early in a project's life.

The NNSA Action Plan of February 6, 2006, establishes NNSA implementation actions and schedules that have taken into account expectations related to integrating safety into design and construction as provided by the Deputy Secretary. These expectations are that:

- Safety is fully integrated into design early in the project. Analysis, design, and procurement specification work must be complete and reviewed for quality early enough to be used as the basis for key decisions.
- Line organizations follow the requirements defined in the project management order and manual (DOE O 413.3, Program and Project Management for the Acquisition of Capital Assets, and DOE M 413.3-1, Project Management for the Acquisition of Capital Assets).
- Line project teams have the necessary experience, expertise, and training to understand the principles of integrating safety into design and construction.
- The Chief of Defense Nuclear Safety (CDNS) will provide safety oversight of projects.
- Staff work and presentations to the Energy Systems Acquisition Advisory Board (ESAAB) include a discussion of relevant safety issues.
- DOE/NNSA learns effectively from its projects and applies that knowledge. Lessons learned from prior experience and the experiences of others are reflected in systematic improvements to processes and procedures for designing and constructing defense nuclear facilities.

In addition to these Deputy Secretary initiatives, NNSA is committed to the following initiatives:

- Improve and re-energize the Integrated Project Team (IPT) and Federal Project Director.
- Pilot an effort to improve the implementation of existing guidance by focusing on a document titled " Project Management Practices," and subtitled "Integrated Safety."
- Ensure that NNSA Federal Project Directors and IPT members have the appropriate training.

We have made significant progress on initiatives in the NNSA Action Plan, but more work needs to be done to successfully integrate safety into design and construction. I will provide a brief summary of each of the action items from the NNSA Action Plan.

1. Enhance Integrated Project Teams and Federal Project Directors' Knowledge of Safety and Design Integration

    - The purpose of this action is to establish NNSA Integrated Project Team (IPT) and Federal Project Director (FPD) expectations to improve safety and design integration. This includes (1) Integrated Safety Management (ISM) training requirements of IPT members and FPDs; (2) guidance on types of safety and subject matter expertise that should be assigned to the IPT; (3) expectations regarding the dedicated nature for this support; and (4) clarification regarding expectations for IPT members and the Technical Qualification Program.

- This action item is partially complete. NNSA has developed expectations for Integrated Project Team members and Federal Project Directors and has provided them to OECM for incorporation into the revised project management order and manual.
- NNSA, in partnership with OECM, will develop enhanced training for IPT members and FPDs focusing on ongoing nuclear projects. This training is scheduled to be developed and piloted by September 2006. This training will include case studies where nuclear safety issues were not addressed in a timely manner in an effort to ensure that we learn from our past.

2. Enhance Chief of Defense Safety Involvement in Nuclear Projects

- The purpose of this action is for CDNS to provide oversight of nuclear projects and enhance the performance of Federal Project Directors and Integrated Project Team (IPT) members in nuclear projects. A desired end state is to ensure that the federal personnel assigned to these projects are appropriately qualified and that the level of effort expected from them is appropriate.
- The action to develop a schedule has been completed and the reviews are underway. The CDNS office has reviewed four projects to date: the Chemistry and Metallurgy Research Building Replacement and Radioactive Liquid Waste Treatment Facility, both at Los Alamos National Laboratory; the Criticality Experiments Facility at Nevada Test Site; and the Uranium Processing Facility at Y-12. These reviews address assigned safety basis and subject matter expert personnel, their active participation in reviews of key safety and design documents, their level of effort, familiarity with the facility safety strategy, identification of key safety issues, quality assurance, etc. Results from these reviews indicate that IPT personnel understand the importance of safety design integration and are actively taking steps to enhance the level of federal expertise assigned to IPTs.
- Two areas requiring improvement were identified. The DOE Manual on project management should emphasize that dedicated support of the IPT members is needed through the duration of the project, and that the composition of the IPT should include the appropriate safety basis personnel and subject matter experts assigned, given the safety system types for the project.

3. Revise and Issue NNSA Energy Systems Acquisition Advisory Board (ESAAB) Equivalent Process

- The purpose of this action is to revise and formally issue a NNSA process for review of critical decision packages to support timely and informed decisions by ESAAB Equivalent Boards.
- The document is complete and is expected to be approved by the NNSA Management Council. The draft includes suggested project preparation

topics for critical decisions, including topics related to safety and design integration. These topics need to be updated to ensure that products and deliverables related to safety basis development are available at the appropriate critical decision point.

- The NNSA ESAAB Equivalent process has been revised to emphasize integrating safety into design, highlight safety documentation that will be required for nuclear projects, and to further clarify Federal Project Director's and Program Office roles.

4. Develop Lessons Learned for Recently Completed Nuclear Projects Review
   - The purpose of this action is for NNSA to learn from past projects to ensure that integrating safety into design and construction is appropriately understood and addressed.
   - This action is partially complete. The project lessons learned on integrating safety into design and construction will be institutionalized, and integrated into the enhanced training for NNSA IPT members and FPDs. This training should be provided on an annual basis to FPDs and IPTs.
   - It is clear from this effort that lessons learned do not appear to be generally well documented. This situation has been addressed in the revisions to Order 413.3. Each project will now be required to prepare a Lessons Learned Report at Critical Decision 4. The Project Management Support Offices are assigned the role of collecting, analyzing, and disseminating these Lessons Learned.

5. Pilot an Effort to Improve Guidance on Integrating Safety Into Design and Construction

   - The purposes of this action are to identify specific project deliverables needed to insure that safety is integrated into design and construction early in a project design and determine the expectations for the level of detail related to these deliverables.
   - This action required the performance of a gap analysis of a current NNSA project with respect to how the project's ongoing activities might satisfy prospective requirements in a "Project Management Practices" document entitled "Integrated Safety. " The selected candidate project was the LANL Transuranic Waste Facility.
   - There were no "gaps" identified in the types, content, and number of documents recommended by the "Integrated Safety" document and those required by the DOE Project Management and Safety Order, Manual, Rules and Regulations. However, there were issues in enforcing the requirements and with the timing for developing and submitting the required documents, and these need to be corrected.

6. Participate in Revision to DOE 413.3 and DOE M 413.3-1

- The purpose of this action is to revise the DOE project management directives to improve the integration of safety into design and construction.
- NNSA personnel have been working with the Office of Engineering and Construction Management and the Office of Environment, Safety and Health on the rewrite of DOE Order 413.3 since our last public meeting. The rewrite process has extended over seven months and has entailed the issuance of two formal REVCOM drafts.
- The remaining issues to be worked out include the DOE Standard 1189, *Integration of Safety into the Design Process*, and DOE Manual 413.3-1, *Project Management for the Acquisition of Capital Assets.*
- DOE Standard 1189, which will provide implementation guidance for the nuclear facilities safety requirements in the Order, is cited as a reference in DOE Order 413.3. However, this standard is not yet ready for issuance.
- The agreed on path forward is to issue the revised DOE Order 413.3, but delay implementation of the revised order on nuclear projects until six months after the issuance of DOE Standard 1189. NNSA will continue to work with the involved parties to produce an integrated set of directives that can further improve both project management and operational safety.

7. Participate in Revision of Associated Directives

- The purpose of this action is to develop or revise DOE safety directives that will improve the integration of safety into design and construction.
- NNSA does have concerns with the system of directives, guides, and standards particularly as it applies to implementation. The CDNS office has the lead and will coordinate with the appropriate NNSA offices to ensure that as the pertinent safety directives are revised, they will provide clear requirements regarding safety into early project phases.

I will address how NNSA intends to "institutionalize" the design processes and products needed to successfully reduce the risk of developing additional safety-related design issues.

First, in terms of organization, I have reorganized Defense Programs to more effectively carry out its current missions and to better organize itself to undertake critical planning and development work associated with fulfilling the Department's emerging Complex 2030 vision for transforming the nuclear weapons stockpile and supporting infrastructure. This includes the formation of NA-17, the Office of Facility and Infrastructure Acquisition and Operation, and consolidation of the construction program within NA-10 under NA-17. This will consolidate the safety and quality oversight and construction activities within one organization. The reorganization will assure uniformly high quality practices are applied to the execution of line item projects. Previously, the reporting

chains followed parallel paths. In addition Ambassador Brooks has realigned the Site Managers to report to the Deputy Administrator of Defense Programs. With this change, I am able to assure that safety is embedded into our projects from their inceptions to their completions.

Secondly, NNSA has institutionalized its expectations in the NNSA document "Energy Systems Acquisition Advisory Board (ESAAB) Equivalent Process." Additionally, we are working closely with EH to develop the new DOE Standard related to safety design integration. The NNSA ESAAAB Equivalent Process document will clearly define the safety design expectations at each critical decision.

In closing, I believe these are important steps to enhancing safety integration into design and construction. But we must be diligent in our efforts to assess our processes and expertise. I want to emphasize to the Board that NNSA is committed to executing our projects safely. To achieve this, I will continue to 1) strive for highly competent Federal Project Directors and Integrated Project Team members; 2) work diligently with others in the Department to clarify and improve our policy and guidance; and 3) enhance NNSA oversight of the project planning and execution, including timely review of the safety analysis and design criteria determinations.

I look forward to your comments and questions. Thank you.

Statement for the Assistant Secretary for Environmental Management
To the
Defense Nuclear Facilities Safety Board
July 19, 2006 Public Meeting - Safety in Design

Mr. Chairman and Members of the Defense Nuclear Facilities Safety Board:

Thank you for this opportunity to provide testimony describing the actions taken by the Office of Environmental Management to integrate safety in design and construction. I will discuss how EM intends to "institutionalize" the design processes and products needed to successfully reduce the risk of developing additional safety-related design issues during the facility life-cycle.

As I have stated previously, EM is aware of the importance of integrating nuclear safety and project management and we firmly understand that safety is more than a priority-it is a core value of the Department. In particular, we understand the importance of:

- Integrating safety early in the design and the subsequent implementation of the design during the construction and startup of the facility recognizing that safety analysis and design development must progress together in an iterative process;

- Defining the complete set of safety requirements early in a project's life cycle and then maintaining configuration control through design, construction, operation, and ultimately, to decommissioning;

- Establishing an appropriate safety strategy including identification of safety class and safety significant structures, systems, and components for nuclear projects, early in a project's life; and

- Ensuring that our Federal Project Directors and Integrated Project Teams have the necessary training and experience to ensure successful integration of safety and design and minimize the risk of safety-related design issues occurring later.

My memorandum of February 10, 2006, establishes my expectations related to integrating safety into design and construction. These include:

- Fully integrating safety into design early in the project. Analysis, design, and procurement specification work must be complete and reviewed for quality early enough to be used as the basis for key decisions.
- Ensuring line organizations follow the requirements defined in the project management order and manual (DOE O 413.3, Program and Project Management for the Acquisition of Capital Assets, and DOE M 413.3-1, Project Management for the Acquisition of Capital Assets).
- Line project teams have the necessary experience, expertise, and training to understand the principles of integrating safety into design and construction.

- The Central Technical Authority and Chief of Nuclear Safety will provide safety oversight of projects.
- Staff work and presentations to both the Energy Systems Acquisition Advisory Board and EM Acquisition Advisory Board include a discussion of relevant safety issues.
- DOE/EM learns effectively from its projects and that this knowledge is successfully disseminated and applied. Lessons learned from prior experience and the experiences of others are reflected in systematic improvements to processes and procedures for designing and constructing defense nuclear facilities.
- Continuation of efforts to provide any additional guidance to strengthen safety integration into the early phases of design.

EM has made significant progress, but more work needs to be done to successfully integrate safety into design and construction. To date, we have taken action to:

1. Enhance Integrated Project Teams and Federal Project Directors' Knowledge of Safety and Design Integration

   The Department's Federal Project Director Certification process ensures that the FPDs have the necessary training and experience requirements in the area of safety and design. EM, through the certification process, has confirmed that the FPDs have the necessary training and experience to ensure effective integration of safety and design. The Project Management Career Development Program Certification and Equivalency Guidelines require the following areas an individual must possess depending on which of the four levels of certification is needed. They include Integrated Safety Management, Systems Engineering, Design Process, and Design of Safety Systems. We have undertaken a review of the Integrated Project Teams, especially projects requiring nuclear facility expertise, to assure they are appropriately staffed with sufficient expertise in a wide variety of disciplines such as ventilation/confinement, nuclear safety, fire protection, operations, and systems engineering. In some cases, we have found it necessary to seek additional expertise and have undertaken actions to fill critical safety positions.

   It is my expectation that the Federal Project Directors and Integrated Project Teams will ensure that the appropriate level of expertise is available in the areas of design, systems engineering, safety systems design, and integrated safety management. The IPT must possess the requisite skills for safety basis authorization which could be vested in the FPD or one or more of the IPT members.

   EM met its goal of certifying Federal Project Directors for all 88 projects. Training gaps have been identified for select FPDs. None of these gaps are specifically related to safety-in-design issues. To address the additional training requirements, EM has prepared specific training plans to correct any deficiencies and the FPDs have been allowed one year to complete the required training from

the time of their certification. We are continuing to evaluate the IPTs to ensure they include the necessary expertise and to monitor the effectiveness of these actions through the DAS for Safety Management and Operations.

2. Enhance the Central Technical Authority and Chief of Nuclear Safety Involvement in Nuclear Projects

   The annual ISMS declaration is being coordinated with the Chief of Nuclear Safety (CNS) for the ESE Central Technical Authority (CTA) as part of implementing the Board Recommendation 2004-1 ("Oversight"). The CTA was briefed on the status of the Salt Waste Treatment Processing facility seismic design issues in October 2005. At that meeting the Central Technical Authority concurred with EM to pursue a more conservative Performance Category 3 for SWPF. The CTA has also directed the Chief of Nuclear Safety to provide technical support to the Independent Project Review Teams. The first scheduled review will be SWPF in September of this year. In addition to participation in the project teams, the CNS is also supporting EM management in the delineation of better nuclear safety expectations that will be developed to reduce safety issues during the design process. Long term impacts will be evaluated through management reviews and lessons learned from project execution.

3. Reissue the EM Acquisition Advisory Board (EMAAB) Equivalent Process

   At this time, EM has implemented a protocol to be formally instituted in a charter for an internal acquisition advisory process for line item and cleanup projects. This process complies with DOE Order 413.3. To date, the EMAAB process has been completed for the Demonstration Bulk Vitrification System Project at the Office of River Protection and the Sodium Bearing Waste Project in Idaho among others.

4. Develop Lessons Learned for Recently Completed Nuclear Projects Review

   Weekly progress meetings continue to be implemented by EM's Chief Operating Officer with key field personnel to provide technical direction and support on all critical projects.

   The Deputy Assistant Secretary for Safety Management and Operations, working closely with the Office of Project Management Oversight has been directly engaged with IPTs during the design process for several high priority EM nuclear facility projects. These include the Salt Waste Processing Facility (Savannah River), the DUF6 Conversion Facility (Paducah and Portsmouth), Sodium Bearing Waste Treatment Facility (Idaho), K-Basins Sludge Treatment (Hanford), and Bulk Vitrification Facility (Hanford). EM field and headquarters have communicated on important design decisions during early phases of the project, including the appropriate seismic design pedigree for buildings and safety systems. Lessons learned from projects at one site have been shared directly with Integrated Project Teams at other sites.

Positive design practices have been noted at several EM projects. For example, the Demonstration Bulk Vitrification System Project at Hanford benefited from an integrated team when conducting process hazard and operability analysis on the facility design. The effort was focused on engineered safety features such as active confinement systems and involved a total of 14 individuals from operations, engineering, nuclear safety, environmental, radiological control, industrial safety, and others. This enhanced IPT process was briefed to the DNFSB and received a very positive feedback.

Another positive example is the Sodium Bearing Waste Project, which had timely integration of not only safety into the design, but also other risk mitigating features. The project also incorporated lessons learned from the SWPF, WTP, and HEU storage project at Y-12. The IPT, in conjunction with EM-HQ, incorporated into the design process, risk mitigation actions to address both SBW product disposition and enhanced structural design for the process cells (e.g., seismic and shielding) to accommodate potential future processing of calcine wastes. An independent team of seismic experts has conducted a review of the seismic conditions at the proposed facility. Their recommendations have been incorporated into the geotechnical studies at the project. A decision to accommodate additional design and operating margins to mitigate both the regulatory and future missions was made as part of the project CD process earlier this year. Additionally, the overall safety strategy, including seismic performance category, was briefed to the Board and received a favorable remarks by the Board Members. Another key to the design and safety basis development is the Hazen pilot plant program. Two pilot plant test campaigns have been conducted in 2005 and 2006. The pilot plant is a 1/10th scale unit of the SBW facility. Results of the test campaigns are a key part of the design process and verification/validation of the safety assumptions and system performance evaluation.

Lessons are disseminated directly to the Field Office Managers and Federal Project Directors through biweekly meetings with EM's Chief Operating Officer as well as the DAS for Safety Management and Operations.

5. Reduce project technical risk through External Technical Reviews

EM believes strongly in reducing the technical risk of our projects and has initiated external technical reviews as one of several steps to ensure the timely resolution of engineering and technology issues. EM recently completed a successful review of the technical issues at the Waste Treatment Plant using expert engineers and scientists from private industry and academia. EM is leading two more external technical reviews of the Demonstration Bulk Vitrification System at Hanford and of Tank 48 at Savannah River. EM is working closely with our Federal Project Directors to review such issues as nuclear safety, systems integration, design, operations, maintenance, and

technology development. Additional external technical reviews will be conducted to support key project decisions and will be a mainstay of our program.

6. Continue Effort to Improve Guidance on Integrating Safety Into Design and Construction

EM now requires, as part of the annual ISMS declaration[1], demonstration of how the ISM functions are implemented for design/construction projects. It is my belief that ISMS is not just for facility operations, but also extends to design and construction. Another action has to do with establishing a systematic process for delegating approval authorities to field managers that requires consideration of available safety expertise. Facility design decisions are monitored directly by designated Safety Basis Review Teams that are comprised of multi-disciplined personnel with expertise in areas such as fire protection, industrial hygiene, health physics, nuclear safety, chemical safety, and criticality safety. These teams are established early in the design process and conduct reviews of project safety documents such as hazards analysis, Preliminary Documented Safety Analyses, and system design documents. At a minimum, a preliminary list of Safety Structure Systems and Components and their safety functional requirements and design pedigrees (e.g. Seismic performance) must be developed as early as possible: by CD-1. Review teams meet periodically with the project director at each Critical Decision to ensure that the facility design is compliant with appropriate safety standards.

EM continues to work with other Departmental elements to increase safety assurance in design. Some of the actions undertaken to date include development of deterministic safety design criteria and conceptual functional requirements for safety related systems, structures, and components to be applied no later than Critical Decision-1; better defining the expectations in DOE O 420.1B *Facility Safety* and associated standards/guides on natural phenomena performance categories and other safety functional requirements for worker protection; developing guidance on the definition of "major modifications" to existing facilities to ensure correct application of nuclear safety design requirements.

EM has also issued a guidance document entitled, "Interim Guidance on Safety Integration into Early Phases of Nuclear Facility Design,"[2] to the field with concurrence from the CNS. The guidance encourages additional emphasis and focus on safety during the early stages of project design, particularly at Critical Decision-1 and a more prescriptive approach on selection and design of safety systems for Hazard Category 2 and 3 facilities. For example, Hazard Category 2 facilities that process readily dispersible forms of radiological material would, at a minimum, select fire protection and confinement ventilation systems as safety

[1] Fiscal Year 2005 Annual Integrated Safety Management System Declaration, September 27, 2005; and Fiscal Year 2006 Annual Integrated Safety Management System Declaration, July 13, 2006, both signed by Dr. Inez Triay, EM Chief Operating Officer.
[2] The EM Chief Operating Officer issued interim guidance on July 18, 2006.

systems, unless otherwise justified through a technically sound exemption including PHA results.

7. Participate in Revision to DOE 413.3 and DOE M 413.3-1

   EM personnel have been working with the Office of Engineering and Construction Management and the Office of Environment, Safety and Health on the revision of DOE Order 413.3 since our last public meeting. The revision process has extended over seven months and has entailed the issuance of two formal REVCOM drafts. We note the current draft's dependency on two associated directives that are still in the formative stages of development including DOE Standard 1189, *Integration of Safety into the Design Process* and the revised version of DOE Manual 413.3-1, *Project Management for the Acquisition of Capital Assets*. These two directives will provide necessary insight into application issues such as "tailoring", matching the capabilities of the project team to the demands of the project, and "safe harbor" methods of demonstrating that the proposed designs satisfy the environmental, safety, and health requirements that have been established. EM also advocates the inclusion of a chapter in the Manual regarding the management of our cleanup projects. I believe that this chapter should be included so that we can manage the majority of our projects using methods best suited to the task. I wish to assure you that EM will continue to work with other Department organizations to produce an integrated set of directives that can further improve both project management and operational safety.

8. Operational Safety Performance

   In addition to our basic statistical methodology to monitoring safety performance EM has also adopted a project based approach. By using the EM Earned Value Management System (EVMS), we are now able to directly tie project performance with a contractor's safety performance. The EVMS model to normalization clearly aligns our commitment to manage safety through project performance and offers us the ability to normalize safety performance data by site, prime contractor, and corporate contractor.

Finally, I will like to quickly address how I have reorganized the Office of Environmental Management to more effectively carry out its current missions and to better organize it to undertake critical planning and development work associated with fulfilling the EM mission. This includes the establishment of EM-60, the Deputy Assistant Secretary for Safety Management and Operations. This will consolidate the safety and operations oversight within one organization. I have also established the Office of Project Management Oversight within the Deputy Assistant Secretary for Acquisition and Project Management (EM-50) to assure uniformly high quality practices are applied to project management, planning, and execution, and the Office of Engineering and Technology (EM-20) to reduce technical risk and uncertainty in the EM program and projects,

through technical reviews, assistance, and technology development and deployment. EM has also reestablished its acquisition advisory process and is continuing to work to clearly define the safety and design expectations at each critical decision.

We believe the efforts I've described have helped increase the awareness of safety and design integration and resulted in an improved safety posture at several facilities that are planned. We will continue to ensure strong interactions between DOE headquarters, field sites and design and construction contractors.

In closing, I believe these are important steps to enhancing safety integration into the entire life cycle of EM projects, from conceptual design to operation. I want to emphasize to the Board that EM remains committed to executing our projects safely and to ensuring safety is integrated early in the design process. To achieve this, I will continue to 1) strive for highly competent Federal Project Directors and Integrated Project Team members; 2) ensure the Federal Project Directors and Integrated Project Teams have the tools necessary to accomplish their task; 3) continue to work diligently with others in the Department to clarify and improve our policy and guidance; and 4) enhance EM's oversight of the project planning and execution, including timely review of the safety analysis and design criteria determinations.

I look forward to your comments and questions. Thank you.

Statement by the Director, Office of Engineering and Construction Management, U. S. Department of Energy To the Defense Nuclear Facilities Safety Board

July 19, 2006

Mr. Chairman and Members of the Defense Nuclear Facilities Safety Board, good morning. For the record, I am Bob McMullan, the Director of the Office of Engineering and Construction Management. I am pleased to outline the progress OECM has made with the upcoming publication of the revised DOE Order 413.3, *Program and Project Management for the Acquisition of Capital Assets.*

The Secretary's August 10, 2005 memo, *Improving Project Management*, and my testimony before you in December, 2005, acknowledged the need for OECM to revise the Order and for programs and projects to assume accountability for successful project management. Our goal is to create a culture within the Department of Energy that promotes:

- integrating safety into design and construction;
- disciplined upfront planning; realistic estimates of cost, schedule and performance; and
- straightforward communication between the project director and senior management.

I would first like to discuss the Department's position on why the changes being made to the order are necessary, how they will result in needed improvements to support safety into design, and finally, our plans for updating the DOE Manual 413.3-1, *Project Management for the Acquisition of Capital Assets.*

Safety is of paramount importance to the Department and to OECM. Recent history shows that we can improve our performance by integrating safety early into design. By so doing, we adequately identify and resolve safety issues in a manner that will ensure requirements are fully analyzed and addressed, which will ultimately reduce project delays and cost overruns. Although safety is an integral part of DOE's project management, we recognize the need to improve how safety is incorporated into design, especially in the early project planning phases. Projects such as the Waste Treatment Plant at Richland and the Salt Waste Processing Plant at Savannah River make clear the need to better incorporate safety into early design activities.

In January 2006, OECM began the challenging task of updating DOE Order 413.3 to clarify and strengthen project management within the Department and specifically to more clearly integrate safety into design and construction. Our goals included: 1) to more completely describe safety requirements for design and construction; 2) to identify references to the required safety directives and standards; 3) to clarify coverage of tailoring as it applies to safety requirements; and 4) to improve the roles, responsibilities, accountability, and oversight related to safety.

DOE's approach to integrating safety into design and construction is a corporate effort. While OECM has the specific responsibility for updating the Order, we are collaborating with the Office of Environment, Safety and Health; the Office of Science; the Office of Environmental Management; the National Nuclear Security Administration; the Energy, Science and Environment Field Management Council; and others to ensure that safety is part of all phases of the project. We agree with the Board that safety cannot be inspected into our projects. It must be part of the Department's project management culture.

Over the course of the last several months, OECM held more than 25 meetings with the DOE Program Offices; the Chiefs of Nuclear Safety; the Energy, Science and Environment Field Management Council; the Department's Staff Offices (ES&H, CIO, CFO, SP/OA, etc.) and the Energy Facility Contractors Group to identify specific improvements to the Order. The first draft was released into the Department's REVCOM process as planned in April. Through the Department's REVCOM process, over 900 comments and recommendations were received, considered and dispositioned in the first draft alone. The comments and recommendations came from all major Programs including the National Nuclear Security Administration; Environmental Management; Environment, Safety & Health; and Science. The second draft was submitted to REVCOM in June and the final comments have been received and adjudicated. Additionally, OECM reviewed and, we believe, successfully addressed the very constructive comments from the Defense Nuclear Facilities Safety Board staff. As of Monday, all departmental elements have

concurred with the revised Order. I expect to transmit the Order to the Deputy Secretary for signature shortly.

Let me summarize the significant changes reflected in the revision to DOE Order 413.3:

Applicability

The Order is applicable to capital asset acquisition projects having a Total Project Cost greater than $20 Million.

However, the project management principles as set forth in the Order and the Project Assessment and Reporting System requirements continue to apply to all projects with a Total Project Cost greater than $5M.

Critical Decision Thresholds and Authorities

The Under Secretaries have been included in the Critical Decision process, having specific responsibility for projects between $400M and $750M. In keeping with the Secretary's August 10 memo to improve project management and to increase line management accountability, Critical Decision Authority Thresholds have been increased.

Projects with a Total Project Cost greater than $750M are now Major System Projects, up from $400M.

Projects with a Total Project Cost less than $750M are Non-Major System Projects.

Environmental Management Clean-up Project Critical Decision Authority Thresholds were included in the Order but were not increased from the previous delegated authority to the Assistant Secretary for Environmental Management at $1B and below.

Integration of safety into design and construction has been clarified and strengthened, particularly for Hazard Category 1, 2, and 3 nuclear facilities.

Safety requirements for each Critical Decision have been more clearly identified.

A Conceptual Safety Design Report is required at CD-1, which will identify a preliminary seismic design category for the facility itself as well as Safety Class and Safety Significant (SSCs).

A Technical Independent Project Review, which focuses on safety documentation, was added as part of the CD-1 Design Review for high-risk, high-hazard, and Hazard Category 1, 2, and 3 nuclear facilities.

Integrated Project Team membership requires technical safety expertise.

Explanatory language with the direct input from the Defense Nuclear Facilities Safety Board has been added to Tailoring and Design Build projects to emphasize the importance of safety. Specifically, the following DNFSB recommended language has been included in the Order revision:

(1) "To address potential complications, aggressive risk mitigation strategies are required to address the unique characteristics of close-coupled or fast-track design-build projects. Risk management strategies must be outlined in the risk management plan and at a minimum address: (1) all technical uncertainties, (2) the establishment of design margins to address the unique nature of the design, and (3) increased technical oversight requirements."

(2) "Moreover, concerning matters relating to integrating safety into the early design of a facility, it is not anticipated that tailoring or modification of the acquisition process would be desirable."

Other Improvements

Roles and Responsibilities were updated to include the:

Under Secretaries

Central Technical Authorities

Chief of Defense Nuclear Safety and Chief of Nuclear Safety

OECM has worked closely with the Office of Environment, Safety and Health, Russell Shearer's staff, to incorporate the safety requirements into the revised Order. 413.3 now identifies the safety requirements for each Critical Decision point. As you are aware, the Office of Environment, Safety and Health will publish DOE-STD-1189-

2006, which will provide implementation guidance for the nuclear facilities safety requirements mandated in the Order. As suggested by the Defense Nuclear Facilities Safety Board staff, the Order was modified to allow a delayed implementation of these requirements until six months after issuance of the Safety Standard by the Office of Environment, Safety and Health.

Next, OECM will begin the process of updating the DOE Manual 413.3-1. Our preliminary plan is to revise and issue the Manual chapter by chapter, allowing chapters to be issued based upon the Department's priorities. The Manual, like the Order will make clearer reference to safety standards and requirements. While we would have preferred to revise and reissue the Manual simultaneously with the Order, the level of effort necessary to accomplish this goal would have meant a significant delay in the publication of the revised Order. Issuing the Order at this time will begin to place needed emphasis on the importance of the safety requirements and all our field sites will be able to begin early assessment of the impact of these requirements on their projects. With the exception of the safety requirements discussed earlier, Programs must not delay implementation of the Order awaiting the revisions to the Manual, Where necessary, Programs are expected to issue implementing guidance pending the update to the Manual.

In closing, the Department has a solid foundation and is moving in the right direction in improving its project management practices. We are making the needed improvements to effectively incorporate safety into design and construction so that

we can reach our goal of world-class project management. I expect that we will learn effectively from our project experience so that future projects are more likely to be completed on time and on budget with all mission and safety objectives satisfied.

Thank you Mr. Chairman and Members of the Board. I now welcome any questions that you may have.

Prepared Statement of

C. Russell H. Shearer
Acting Assistant Secretary for Environment, Safety & Health

Integration of Safety into Design

Defense Nuclear Facilities Safety Board
July 19, 2006, Public Hearing

INTRODUCTION:

I am pleased today to outline the activities that the Office of Environment, Safety and Health ("EH") is undertaking to integrate safety considerations into design. The Department of Energy's ("DOE" or "Department") procurement regulations require contractors to establish an Integrated Safety Management System ("ISMS") that will integrate safety into design activities. Integrating safety into design, in my view, is a good business practice, and it is, equally importantly, a good safety practice. It ensures that facilities can meet mission requirements while maintaining adequate protection for the workers, the public, and the environment. Integrating safety into design, in short, helps the Field succeed with safe and reliable operations.

The early integration of safety and design, more pointedly, allows the development of timely and cost-effective solutions from the start, rather than as a back-fit during facility operations. And continuous development and integration of hazards and safety considerations is an integral part of design for those facilities that contain or will contain hazardous materials. EH thus undertook a two-pronged approach to evaluating and strengthening the Department's integration of safety into design. First, EH reviewed DOE's safety regulations, directives, and standards and ascertained those that require revision in order to provide more clear or better guidance concerning how and when safety considerations should be integrated into new design and construction projects. Second, EH has provided technical assistance to the Field in order to assist them to integrate safety into design.

POLICY DEVELOPMENT

1. DOE O 413.3, *Project Management for the Acquisition of Capital Assets*

EH worked with the Office of Engineering and Construction Management (OECM) to revise DOE O 413.3, *Project Management for the Acquisition of Capital Assets*. This revised Order establishes safety and quality assurance requirements that must be integrated into the key Critical Design (CD) stages—CD-1 through CD-4—of project planning. A key change in this revised Order is the identification of potential

hazards early in project planning, even at the pre-conceptual planning (CD-0) stage. CD-0, for example, requires the preparation of a mission needs statement that discusses the potential hazards of the project, as well as their safety, security, and risk implications.

The revised DOE O 413.3 will contain similar environment, safety, and health ("ES&H") requirements for CDs one through four.[1] CD-1 requires that the contractors implement ISMS into management and work-process planning at all levels, and, for nuclear Hazard Category 1, 2, and 3 nuclear facilities, that they prepare a Conceptual Safety Design Report (CSDR), which contains the following:

- A preliminary hazard categorization of the facility;
- A preliminary identification of facility Design Basis Accidents (DBAs);
- An assessment of Safety-Class and Safety-Significant Structures, Systems and Components (SSCs) based on the preliminary hazards analysis of facility-level DBAs;
- A preliminary assessment of the appropriate Seismic Design Category (SDC) of facility SSCs;
- A security hazard evaluation; and
- A commitment to the nuclear-safety design criteria of DOE O 420.1, *Facility Safety* (or proposed alternative criteria).

Environmental impact and quality assurance issues must also be considered at this early phase of design.

At CD-2 for Hazard Category 1, 2 and 3 nuclear facilities, a Preliminary Safety Design Report (PSDR) must be submitted to DOE for approval. The PSDR updates the CSDR to reflect more refined information and analyses as design progresses. At CD-3, a Preliminary Documented Safety Analysis (PDSA) must be prepared and submitted for DOE approval in accordance with the requirements of 10 CFR 830.206. Again, the PDSA updates the information and analyses presented in the PSDR. DOE must analyze and approve the contractors' safety report through preparation of a Safety Evaluation Report ("SER") at each of the preceding stages of design review. At CD-4, the contractors must prepare a Documented Safety Analysis ("DSA") and propose a Technical Safety Requirements document, both of which must comply with 10 C.F.R. Part 830. DOE must evaluate these documents by preparing a SER.

This iterative process is designed to assure contractor consideration and DOE oversight of facility hazards and designation of safety SSCs at the earliest possible design stage. This consideration and oversight, of course, is based on available information,

[1] This testimony specifically addresses nuclear facilities. The revised Order, importantly, does not neglect non-nuclear facilities and includes similar requirements applicable to high-risk and high-hazard non-nuclear facilities to ensure that safety is integrated into design for those facilities, as well.

conservative analyses, and objective criteria. Additional information on the consideration of facility hazards and designation of important safety SSCs will be provided in DOE-STD-1189, *Integration of Safety into the Design Process,* which is currently under development. I will describe DOE activities on this standard later in this testimony.

The revised Order will also clarify the functions and responsibilities of DOE organizations in project planning and execution, for which EH will play an important role on the Energy Systems Acquisition Advisory Board ("ESAAB"), which is chaired by the Deputy Secretary, and in External Independent Reviews ("EIR") and Independent Project Reviews ("IPR"). EH remains a member of the ESAAB and will continue to provide ES&H counsel to the Deputy Secretary, independent of line management missions and functions. EH is also authorized to serve as an IPR member, conduct independent safety reviews, participate on Operational Readiness Reviews (ORRs), or support the Central Technical Authorities (CTAs) if requested by line management. I will briefly discuss EH activities in these reviews later.

The revised order, in sum, will provide the mechanisms and processes for line management to obtain independent safety assessments and advice from EH. I consider EH's role in project planning and execution crucial to the proper interpretation and implementation of DOE's safety requirements and standards. And, more importantly, I am pleased with the manner in which the Department has recognized and addressed this issue. Indeed, addressing it in a manner that seeks to resolve vexing challenges and that adopts a new business model for integrating safety into design.

2. DOE Manual to Accompany DOE O 413.3, *Project Management for the Acquisition of Capital Assets*

EH will contribute to revising the Manual to accompany the Order 413.3 once promulgation of the Order is complete, which is expected to be August 2006. EH will develop guidance for the Manual regarding ISMS, environmental compliance, Quality Assurance, worker safety, and non-nuclear safety. That guidance, for example, will address the conduct of readiness reviews for non-nuclear projects with high hazardous materials. The DOE standard on integrating safety into design, DOE-STD-1189, will provide additional nuclear-safety guidance to supplement the Order.

3. DOE-STD-1189, *Integration of Safety into the Design Process*

EH and the Energy Facility Contractors Group ("EFCOG") identified the need to develop jointly a safety and design standard in November 2005. While we believed our fundamental safety basis requirements for design and construction projects were adequate, DOE and EFCOG recognized that the requirements were insufficient to provide the necessary details of safety expectations at the various CD stages. EH thus sought the assistance of three EFCOG groups—the Engineering Practices, Project Management, and Safety Analysis Working Groups—to help develop a totally new standard.

A DOE-EFCOG safety and design working group was formed at the Safety Analysis Working Group meeting in early February 2006. EH is the DOE lead for this working group, with headquarters and field representatives from NNSA, EM, NE, and the CTA organizations. The DNFSB staff attends the working group meetings. The working group committed to develop a draft standard and submit it into DOE RevCom review by October 2006 for DOE-wide review and comment.

The working group held its first workshop in March 2006 with follow up workshops in May and June of this year. Three writing teams were also formed—the Design Process, Major Modification, and Interface Team. The working group agreed on most approaches to define DOE safety and design expectations for CSDR, PSDR, PDSA and DSA at the CD-1 through CD-4 project stages, and the writing teams completed initial drafts and a draft outline of DOE-STD-1189. A Safety and Design Integration (SDI) team was formed at the June workshop. The SDI team is meeting in Colorado on July 18-20, 2006, to develop an integrated draft. The integrated draft will be available for review by the working group and other key DOE organizations by early August. The working group scheduled a August 21-24 workshop in Albuquerque to develop a final draft.[2]

In addition to the efforts of the working groups and writing teams, I have hosted several senior-level meetings with NNSA, EM, SC, NE, and EFCOG to discuss and evaluate approaches that would enable the Department to set clear expectations to which it could then execute oversight. The purpose of these meetings, in part, is to provoke thinking on the issue and to bring out issues in advance of the RevCom process. It is also to consider fully the options before reaching a conclusion so that the conclusion is a useful process that is a sustainable business practice for the long term.

Our current approach is to establish in the technical standard a methodological procedure for evaluating and mitigating hazards. That procedure calls for the analysis to evolve through the CD process in response to increasingly detailed information about the hazards and their mitigation. The analysis begins at the CD-0 and CD-1 stages with a set of reasonably conservative design assumptions. These design assumptions become more focused and sharp, eventually becoming the design requirements, through a standardized and consistent methodology applied throughout CDs one through four to yield the correct hazard controls based on the hazards presented. The Department, in addition to day-to-day oversight, evaluates and approves the design conclusions through the formal SER process laid out previously during my discussion of DOE O 413.3. The intent of this process is to begin with a full, reasonably conservative "basket" of safety controls and to use a standardized analysis process to reach the "correct" or "optimal" set of controls given the nature of the hazards. Each iterative phase of the analysis should provide the rationale for the safety conclusions reached therein and should, in total, create a record

[2] I thank all those who volunteered their time and effort and also acknowledge EFCOG's important role in addressing these crucial issues.

demonstrating and explaining why the Department reached the safety and cost conclusions it did.

DOE recognizes that other interface and implementation issues remain. First, we recognize that DOE O 413.3 is scheduled to be issued before the standard is complete. While DOE-STD-1189 is cited as a reference in DOE O 413.3 for further implementation details and guidance, it will not be formally issued for implementation guidance until it is reviewed and approved as a DOE directive. We met with your staff recently to discuss this DOE-STD-1189 "lag" issue. An option might be to issue DOE O 413.3, but delay implementation until the final publication of the standard. We will keep you apprised on how we resolve this implementation issue.

Second, we recognize that DOE-STD-1189 will be issued as implementation guidance for DOE's expectations to meet the nuclear design, quality assurance, and safety basis provisions of 10 CFR Part 830. Its issuance as a DOE technical standard was initially viewed as the most expeditious way to develop and issue the implementation guidance. But we also recognize that its use might be considered discretionary if the standard is not included in contracts or if the standard is not embedded as a "safe harbor" in Part 830. EH is leading DOE efforts to consider possible options to address this issue, including considering a revision to 10 CFR Part 830 that would mandate this standard as a safe harbor.

4. Potential Impact of DOE O 413.3 Changes to Other Safety Directives

EH will review other DOE directives and standards after the technical standard is issued in order to determine whether additional conforming changes and supplementary information is necessary. I view the following as preliminary candidates for that review:

- 10 CFR Part 830;
- DOE O 420.1B;
- 10 CFR Part 851;
- DOE-STD-1104, *Review and Approval of Nuclear Facility Safety Basis Documents (Documented Safety Analysis and Technical Safety Requirements)*; and
- DOE-STD-1073, *Configuration Management Program.*

EH IMPLEMENTATION SUPPORT ON SAFETY/DEISGN INTEGRATION

EH monitors and assesses implementation issues in several ways. As I just indicated, we work with the contractor organizations and DOE line management to address and resolve issues as they arise. EH also provides support to Headquarters and field organizations in areas of safety and design requirements and field implementation. In the areas of nuclear and facility safety, the EH staff conducts reviews of safety

documents and programs for various CD phases of acquisition projects to determine if the hazards and accident analyses are performed adequately and the safety controls are identified early to reduce the impacts of potential back-fitting.

EH is now consistently invited by the line organization to participate in the Safety Basis design review and the Independent Project Review (IPR) for major DOE projects early in the project design phases. These reviews have contributed to early revisions and improvements of safety in design. Additional EH corporate support areas include NEPA, worker safety and ORRs. During the CD-3 construction phase, EH can provide worker safety support for construction activities. EH also provides support for ORRs prior to CD-4 (Approve Start of Operations). EH, in short, supplies technical services to the Field, including a quasi- or mini-engineering design reviews on ES&H matters, to assist it integrate safety into design, and in furtherance thereof I have devoted significant new assets to this function, including additional manpower and technical expertise through a technical support-service contract.

Examples of EH technical support activities in safety and design integration are summarized as follows.

1. Energy Systems Acquisition Advisory Board (ESAAB)

EH reviews the adequacy of ES&H aspects of projects and advises the Deputy Secretary during the ESAAB meetings. Some of the recent examples are:

- Critical Decision-1 (CD-1) approval of the Los Alamos National Laboratory (LANL) Chemistry and Metallurgy Research Replacement Project (CMRRP) (May 2005)
- CD-1 approval of the Pacific Northwest National Laboratory (PNNL) Capabilities Replacement Project (CRLP) (December 2005)
- CD-1 approval of the Yucca Mountain Project (YMP) (July 2006)
- CD-0 approval of the Global Nuclear Energy Partnership (GNEP) Project (April 2006)
- CD-2/3 approval of the Mixed Oxide Fuel Fabrication Facility (MFFF) Project (July 2006)

2. Independent Project Review (IPR)

EH staff members participate in the IPRs at the request of the line organizations. Typically, an IPR team reviews a broad range of subject areas, including cost, security, acquisition strategy, and ES&H. EH has been responsible for some of the ES&H reviews, including the following:

- Preparation for CD-1 approval of the Y-12 Uranium Processing Facility (January 2006)

- Preparation for CD-1 approval of the Los Alamos National Laboratory (LANL) Nuclear Materials Safeguard and Security Upgrade Project (NMSSUP) – Phase II (May 2006)
- Preparation for CD-0 approval of the Y-12 Potable Water System Upgrade Project (August 2005)

3. External Independent Review (EIR)

EH provides support to the Office of Engineering and Construction Management (OECM) in reviewing the safety aspects of the External Independent Review (EIR) process, participating in the EIR activities as an observer, providing technical information to the EIR team, and reviewing the EIR team's reports. Insights from the EIR involvement provide the technical basis to support EH-1 in the ESAAB. A recent example of EH's involvement on an EIR is the Savannah River Site Mixed Oxide Fuel Fabrication Facility (April to June 2006).

4. Safety Basis Review Team

At the request of line organizations, EH provides technical assistance on Safety Basis Review Teams formed by the line organizations for specific projects. Recent examples of such assistance include the following:

- Pacific Northwest National Laboratory (PNNL) Capabilities Replacement Laboratory (CRL) (March 2006 through completion of CD-4)
- Advanced Test Reactor Design Basis Reconstitution Program (January 2006 to January 2008)

CONCLUSION

In summary, EH has important safety management policy and implementation functions and responsibilities that support contractor and line management on DOE acquisition projects. EH's mission is to establish safety policy that is based on the best information and technology available and to support the Field in implementing that policy. We work with our contractor and line organizations, we interact with industry and governmental organizations, and we deploy our resources to ensure we have the best available knowledge supporting our safety policies and standards.

But it is not enough that EH provide sound policy and effective implementation assistance in this important area. DOE line organizations must improve its oversight of contractor design and construction activities. While revisions to DOE O 413.3 and development of DOE-STD-1189 will, I hope, drive improvement, I believe that a discrete focus of DOE line oversight under DOE O 226.1, *Implementation of DOE Oversight*

Policy, should be oversight of these activities. EH is leading the current activity to develop DOE M 226.1, *DOE Safety Oversight Manual,* and we will propose a DOE oversight activity with review criteria for design and construction activities. As with other DOE safety policy, EH will help the Field succeed with safe and reliable operations.