Department of Energy
National Nuclear Security Administration
Washington, DC 20585

September 16, 2005

OFFICE OF THE ADMINISTRATOR

The Honorable A.J. Eggenberger
Chairman
Defense Nuclear Facilities Safety Board
625 Indiana Avenue, N.W.
Suite 700
Washington, D.C. 20004-2901

Dear Mr. Chairman:

Your March 8, 2005, letter requested a report from NNSA on the path forward for resumption of programmatic operations in the Plutonium Facility (B332) at Lawrence Livermore National Laboratory (LLNL). Your letter indicated that the Board was concerned that the approach being taken by the Livermore Site Office (LSO) to resolve identified deficiencies and resume nuclear operations did not adequately address the safety issues raised by noted violations of Technical Safety Requirements (TSR) and deficiencies in safety system analysis.

The enclosed report from LSO has been prepared in response to each specific concern cited in your March 8, 2005, letter. Since the January 15, 2005, programmatic stand-down at B332, NNSA has noted significant progress addressing B332 safety issues, and a number of important actions have been taken by LLNL and LSO. Compensatory measures to assure safety have been developed for areas such as radiation protection, procedures, the Unreviewed Safety Question (USQ) Program, configuration management, maintenance, quality assurance, and occurrence reporting. LSO approved LLNL's Corrective Action Plan for issues arising out of the Office of Independent Oversight (OA-40) review on April 20, 2005. LLNL has submitted the Technical Safety Requirement Recovery Plans for the TSR violations for LSO review, including the Recovery Plan for the Fire Protection Program. LSO identified additional actions to supplement the recovery plans and has directed LLNL to include all recovery actions in the B332 Safety Basis. LSO and LLNL have conducted joint reviews of all the Vital Safety Systems in B332 to assess current corrective action progress, system condition, and configuration management and operability, and have concluded that all of the systems are operable.

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LSO and LLNL plan to resume interim level and full operations in accordance with the requirements and procedures in the site specific documents implementing DOE O 425.1C. The stand-up to limited programmatic operations will be approved when the confirmation of readiness has been completed. LLNL and LSO are working to develop a path forward for resumption of full operations. LSO will provide the details of this path forward to your staff as it is developed.

If you have any questions, please contact me or have your staff contact Mike Thompson at 301-903-5648 or Sam Brinker, LSO at 925-422-0710.

Sincerely,

Linton F. Brooks
Administrator

Enclosures

cc: C. Yuan-Soo Hoo, LSO Manager
M. Whitaker, DR-1

Report to the

Defense Nuclear Facilities Safety Board

On the

Resumption of Programmatic Operations in Building 332 Lawrence Livermore National Laboratory

September 7, 2005

National Nuclear Security Administration

Prepared by

Department of Energy
National Nuclear Security Administration
Livermore Site Office

Rev. 3

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Report to the Defense Nuclear Facilities Safety Board
On the
Resumption of Programmatic Operations in Building 332
Lawrence Livermore National Laboratory

Prepared by
Department of Energy
National Nuclear Security Administration
Livermore Site Office

I. EXECUTIVE SUMMARY

On January 15, 2005, Lawrence Livermore National Laboratory (LLNL) initiated a programmatic stand-down of Building 332 (B332) operations in order to fully focus on assessing safety related issues and findings. On March 8, 2005, the Defense Nuclear Facilities Safety Board (DNFSB) requested that a report be prepared regarding the approach being taken by the NNSA Livermore Site Office (LSO) to resolve identified deficiencies and resume nuclear operations in B332.

Significant progress has been made towards addressing safety issues since the stand-down and a number of important actions have been taken by LLNL and LSO. Compensatory measures to assure safety have been developed for areas such as radiation protection, procedures, the Unreviewed Safety Question (USQ) Program, configuration management, maintenance, quality assurance, and occurrence reporting. LSO approved LLNL's Corrective Action Plan (CAP) for issues arising out of the Office of Independent Oversight (OA-40) review on April 20, 2005. LLNL has submitted the Technical Safety Requirement (TSR) Recovery Plans for the TSR violations for LSO review, including the Recovery Plan for the Fire Protection Program. LSO identified additional actions to supplement the recovery plans and has directed LLNL to include all recovery actions in the B332 Safety Basis. LSO and LLNL have conducted joint reviews of all the Vital Safety Systems in B332 to assess current corrective action progress, system condition, and configuration management and operability, and have concluded that all of the systems are operable.

In developing a path forward, LSO took into consideration that the primary issues identified for B332 were configuration management, the TSR Administrative Control Programs, and the operability of vital safety systems. The recurring themes to all the findings are a lack of proper configuration management and inconsistent conduct of operations, especially in the area of procedural compliance. Many of the problems in B332 can be attributed to the fundamental issues of culture and a lack of resources at LLNL. In order to ensure safety when interim operations are resumed, LSO will rely

upon Integrated Safety Management (ISM) to bring together the safety basis, the procedures, the equipment that performs safety functions, and the people.

Each of these areas is being addressed prior to resuming operations. For the safety basis area, compensatory measures are being used to reduce risk and ensure safety during the interim operations. Compliance with procedures has been observed by the Management Self-Assessment (MSA) and will be reviewed by the Readiness Assessment. A new conduct of operations manual has been developed and concerns about procedure adherence have been emphasized in the conduct of operations training. The equipment that performs safety functions underwent reviews by LSO, as well as joint reviews by LSO and LLNL to determine operability. The LLNL MSA employed teams of independent subject matter experts to evaluate the equipment and confirm readiness for operations. The last area, the people, has been strengthened by the addition of significant staffing increases by LLNL to support work at B332. LLNL senior management is stressing procedural adherence, proper conduct of operations, and resource-based project scheduling.

To ensure safety, a gradual resumption to full operations will be used. Initially, only a limited, relatively low risk scope of work will be allowed. Performance of work during this time will be closely watched by LLNL management and LSO to evaluate how effective the corrective actions have been in addressing the identified deficiencies. During this period, as corrective actions are completed, they will be verified using LSO's Verification and Validation procedure and the associated compensatory measures will be removed. Full operations will only be authorized after sustained safe operations of limited risk work have demonstrated the effectiveness of the procedures, equipment, and people.

LSO and LLNL plan to resume intermediate level and full activities in accordance with the requirements and procedures in the site specific documents implementing DOE O425.1C. LSO and LLNL have developed a Memorandum of Understanding (MOU) which will guide the readiness process. LLNL and LSO have prepared a Readiness Plan (RP) in preparation for the Readiness Assessment (RA). LLNL has completed a MSA of all the Administrative Control programs. Completion of this MSA and the closure of any pre-stand-up findings identified is an important prerequisite for LLNL's declaration of readiness. Based on completion of the MSA, the LLNL Facility Manager issued a "Readiness to Proceed" memorandum on August 12, 2005, and the RA commenced on August 15, 2005.

The stand-up to intermediate level and full programmatic operations will be approved when LLNL has implemented compensatory measures and/or corrective actions, residual risks have been identified, and confirmation of readiness for operations has been completed. Approval of operations will be based on an evaluation of the risk associated with those operations as well as an understanding of the programmatic need.

The report concludes that following a successful RA process, LSO has determined that operations at B332 can be safely resumed. Completion of the RA and resumption of the intermediate level of activities is expected to begin by the end of October 2005.

II. PURPOSE

This report has been prepared in response to the March 8, 2005, letter from the Defense Nuclear Facilities Safety Board to Administrator Brooks regarding the approach being taken by the NNSA Livermore Site Office to resolve identified deficiencies and resume nuclear operations in B332. The letter stated the Board's concern that the approach does not adequately address the safety issues identified by violations of TSRs and by the identified deficiencies in safety system analyses. The Board requested a report on the path forward for resumption of programmatic operations be provided.

III. BACKGROUND

On January 15, 2005, LLNL initiated a programmatic stand-down of B332 operations in order to fully focus on assessing issues and findings from the January 6, 2005, OA-40 report; Defense Nuclear Facilities Safety Board and LSO assessments of configuration management; and other related issues/findings from prior reviews. The intent of the stand-down was to allow LLNL to focus resources on developing an integrated corrective action plan that would allow eventual resumption of programmatic activities when compensatory measures and/or corrective actions are in place. Resumption of any activities within B332 requires LSO approval.

On January 28, 2005, LLNL proposed immediate compensatory measures and on January 31, 2005, LSO approved them. These immediate compensatory measures dealt with radiation protection, procedures, the Unreviewed Safety Question Program, configuration management, maintenance, quality assurance, and occurrence reporting.

On February 9, 2005, LLNL requested approval of a set of compensatory measures to allow the resumption of reduced, intermediate level of programmatic work. LSO reviewed and approved these compensatory measures subject to conditions and clarifications, including a requirement that additional technical justification be provided on several key issues. LLNL provided the additional information in two letters dated March 31 and May 4, 2005. LSO accepted the technical submittal on May 13, 2005, while determining that additional compensatory measures were required to assure worker safety. LSO will verify that these compensatory measures have been implemented as described before issuance of authorization to begin an intermediate scope of work. LSO removed three activities regarded as "high-risk" from the list of potential activities to be conducted as part of the intermediate scope of work for interim operations.

LSO approved LLNL's Corrective Action Plan for issues arising out of the OA-40 review on April 20, 2005. LLNL has submitted TSR Recovery Plans for the TSR violations as required by their Safety Basis documents. After reviewing the Plan, LSO directed that LLNL complete 17 additional recovery actions for B332 TSR violations in seven administrative control programs. LSO and LLNL have developed a formal, well-defined process to verify the adequacy and implementation of compensatory measures and

corrective actions to confirm the readiness of operations. Additionally, LSO and LLNL have conducted joint reviews of all of the Vital Safety Systems in B332 to assess current corrective action progress, system condition, and configuration management and operability. The teams have concluded that all of the systems are operable and have not found any significant vulnerabilities outside of what are already known.

DOE O 425.1(c) is implemented at LSO through the Standard Operating Procedure LSO/LSOD-SOP-000162.02 and at LLNL through the provisions of the LLNL Environment, Safety & Health (ES&H) Manual, Volume 5, Part 51. LSO and LLNL plan to resume intermediate level and full activities in accordance with the requirements and procedures in these documents. As the first step in this procedure, LSO and LLNL have developed a Memorandum of Understanding (MOU) which will guide the readiness process. The MOU details the prerequisites for starting the review and specifies that a Criteria Review and Approach Document (CRAD) based approach will be used. The team leader and team members are required to be independent of the B332 program. LLNL has now completed a MSA of all the Administrative Control programs. Completion of this MSA and the closure of any pre-stand-up findings identified is an important prerequisite for their declaration of readiness. On June 14, 2005, LSO received the LLNL Readiness Plan for the RA. After reviewing it to verify that it meets the expectations detailed in the MOU, LSO approved the Plan.

LLNL has developed a detailed, software-based, resource-loaded schedule of all B332 activities to enable the facility to manage resources and adjust priorities. The schedule currently includes corrective actions related to the OA-40 review, configuration management requirements, and operations relating to the resumption of activities. According to this schedule, completion of the RA and resumption of the intermediate level of activities is expected to begin by the end of October 2005.

The stand-up to an intermediate level of operation will be approved when LLNL has implemented compensatory measures and/or corrective actions, residual risks have been identified, and confirmation of readiness for operations has been completed. Approval of operations will be based on an understanding of the risk associated with those operations, as well as an understanding of the programmatic need.

IV. COMPENSATORY MEASURES

LSO and LLNL have identified a number of compensatory measures which assure safety while programmatic deficiencies are corrected. The nature of these compensatory measures differs depending on the nature of the deficiency and the safety system to which they are applied. These measures can be one-time actions similar to corrective actions. Examples of compensatory measures involving one-time actions include:

- Mandatory safety briefings;
- Safety system walk-downs;
- Red-line drawings of safety systems; and
- Comprehensive assessments of vital safety systems.

Compensatory measures can also be continuing restrictions or limits. Examples of this type include:

5 kg Material at Risk (MAR) for operations;
Reduced scope of work;
Higher level document approvals (USQ screenings, work packages); and
Additional surveillances/no grace period.

Compensatory measures will be gradually removed as the corrective actions are completed and the facility's safety programs are shown to again be fully functional. Removal of compensatory measures requires LSO approval.

V. CASE-By-CASE APPROVALS

During the stand down, LSO has required that activities other than a few, pre-approved actions be reviewed and approved on a case-by-case basis. To date, the LSO Site Manager has approved activities dealing in such areas as material storage, security, packaging, movement and accountability, waste handling, training, and equipment repair. These approvals were granted on a case-by-case basis, only after a thorough review by LSO had been completed assessing the proposed work and associated risks against the known deficiencies and compensatory measures to ensure adequate coverage. The following approvals have been made to date:

1) 1/18 - Removal of seismic cuffs
2) 1/25 - Movement of two waste drums
3) 1/26 - Door closure of 1329
4) 2/3 - Inventory closeout of four items
5) 2/4 - Movement of two items
6) 2/3 - Bi-monthly inventory
7) 2/7 - NDE inspection in 1321
8) 2/4 - Move HEU for B334
9) 2/9 - Package/ship JASPER items to NTS
10) 2/25 - Process mixed waste and move
11) 3/4 - Second Door closure request
12) 3/7 - Clarification on door closure (related to item 11 above)
13) 3/16 - Object assembly for B334
14) 3/30 - Changes to TSRs for compressed air system
15) 3/31 - Move two items from B251 to B332 (Pu-242)
16) 4/5 - Move objects from B332 to B334 (HEU)
17) 4/6 - Door closure for Room 1369
18) 4/7 - Transfer Assembly from B332 to B239 (and return)
19) 4/19 - Activities associated with W88
20) 5/6 - US/UK Joint Measurement Activities
21) 5/6 - Enhanced Surveillance Program (spiked gas-gun targets, TEM samples and density)
22) 5/13 - Reduced Activities for Interim Operations
23) 5/23 - Assemble an Object in B332 and perform training in B334
24) 5/24 - Door closure for Rooms 1353, 1354, 1361, 1362, 1377, 1378

25) 6/3 - Handle and move LLW and TRU waste
26) 6/13 - Include low activity U232 source in US/UK Joint Measurement Activities
27) 6/27 - Security tests in Radiation Material Area (RMA)
28) 8/8 - Request to fabricate a JASPER target
29) 8/19 - Environmental testing of an item

Each of these approvals was granted only after a careful consideration of the risks involved, the compensatory measures in place, and programmatic importance and urgency. LSO verified that the appropriate compensatory measures were in place prior to the initiation of work.

VI. APPROACH TO RESUMPTION OF OPERATIONS

From LSO's perspective, the primary issues identified for B332 were configuration management, the TSR Administrative Control Programs, and the operability of vital safety systems. The recurring themes to all the findings are a lack of proper configuration management and inconsistent conduct of operations, especially in the area of procedural compliance. Many of the problems in B332 can be attributed to the fundamental issues of culture and a lack of resources at LLNL. In order to ensure safety when interim operations are resumed, LSO will rely upon Integrated Safety Management to bring together four key elements for safety:

- the safety basis
- the procedures
- the equipment that performs safety functions
- the people

As LLNL began correcting the issues identified in B332, each of these four key elements needed to be addressed for LSO to have confidence that operations would be safely conducted. For the safety basis area, LLNL proposed, and LSO approved, compensatory measures during the interim operations including a reduced material-at-risk, compensatory measures for TSR violations and compensatory measures for potential inadequacies to the safety analysis. Efforts are also being made to resolve issues with the new B332 Documented Safety Analysis (DSA) so it can be re-submitted, approved and implemented expeditiously.

The second area, procedures, has been observed by the MSA and will be reviewed by the RA. A new conduct of operations manual has been developed, and concerns about procedure adherence have been emphasized in the conduct of operations training. LSO also requires procedural violations be reported to the LSO Facility Representative so the number of violations and their significance provide indicators of potential continued problems.

The third area, the equipment that performs a safety function, underwent reviews by LSO and joint reviews by LSO and LLNL to determine operability. The LLNL MSA

employed teams of independent subject matter experts to evaluate the equipment and confirm readiness for operations.

The fourth area, the people, covers the adequacy of the staffing in certain key positions as well as the cultural changes that are necessary both for LLNL and LSO. Staffing associated with B332 has been increased by the addition of a configuration management manager, a work control manager, six system engineers, six safety analysts, and a procurement QA specialist. LLNL senior management have met with facility operators on their concerns associated with the decline in procedural adherence. The conduct of operations training is intended to formalize activities and communications within the facility to a greater degree. The number of resources that can address issues within B332 is being planned via the new project plan to ensure that resources are prioritized and tracked. In many ways, creating and sustaining a cultural change in the work force will be the greatest challenge. Technical inquisitiveness and self-reporting of issues will take longer and continue to be an area LSO will observe, track, and assess.

To ensure safety, a gradual resumption to full operations will be used. Following a RA, only a limited, relatively low-risk scope of work will be allowed. The restrictions on what work may be conducted could last several months to as long as one year. Performance of work during this time will be closely watched by LLNL management and LSO to evaluate how effective the corrective actions have been in addressing the identified deficiencies. During this period, as corrective actions are completed, they will be verified using LSO's Verification and Validation procedure and the associated compensatory measures will be removed. Only after sustained safe operations of limited risk work has demonstrated the effectiveness of the procedures, equipment, and people, will full operations be authorized.

VII. JOINT VITAL SAFETY SYSTEM (VSS) REVIEW

On November 3, 2004, the DNFSB transmitted a letter to the Department of Energy (DOE) expressing concern about "the apparent lack of an adequate configuration management program for the highest-hazard nuclear facilities at Lawrence Livermore National Laboratory (LLNL)". One action requested in the letter was a report documenting NNSA's assessment of the configuration management program for VSS. LSO completed the first review of the LLNL configuration management program for B332 in December 2004 and submitted the report to NNSA/HQ on January 3, 2005. In that report, LSO and LLNL committed to performing comprehensive Phase II-like reviews of the VSS.

The VSS review committed to by LSO has been completed. The review was conducted jointly by LSO and LLNL. The Team which reviewed each Safety System included the LSO Safety System Oversight representative, the LLNL Cognizant System Engineer, and other subject matter experts. Team members were chosen based on their knowledge of the systems and past experience with system reviews.

The teams were provided a Criteria, Review and Approach Document and sample lines of inquiry. The CRAD followed the objectives of DNFSB Recommendation 2000-2 Phase II Assessments. The teams tailored the CRAD to the specific system being reviewed. The objective for the review was broader than just configuration management. The lines of inquiry were broken down along four areas of focus:

- Safety Function – Are the Safety Basis-related technical, functional and performance requirements for the system identified/defined?
- Configuration Management – Are changes to requirements, documents and installed components controlled?
- System Maintenance- Is the System maintained in a condition that ensures its integrity, operability and reliability?
- System Surveillance and Testing – Does the surveillance and testing of the system demonstrate that it is capable of performing its safety function and continue to meet applicable system requirements and performance criteria?

Evaluations were performed for 14 VSS as defined by the Safety Basis documents. The systems evaluated and their safety significance are:

- Emergency Battery Lights – Defense in Depth
- Continuous Air Monitoring System (CAMS) – Safety Significant
- Glovebox Argon Supply System – Safety Significant
- Glovebox Nitrogen Supply System – Safety Significant
- Final HEPA Filters – Safety Class
- Building Structure – Safety Class
- Emergency Electric Power System – Safety Class
- Criticality Alarm System – Safety Significant
- Room Ventilation System – Increments 1 and 3- Safety Class
- Glovebox Exhaust System – Safety Class
- Fire Alarm and Detection – Safety Significant
- Gloveboxes – Safety Significant
- Fire Suppression/Detection System – Safety Class
- TRU Waste Containers – Safety Significant

The teams reviewed safety basis documents (draft B332 DSA and TSRs), to ensure each system was identified and accurately described. The teams also reviewed other important documents such as operating procedures, technical documents, surveillance procedures, and maintenance task codes to fully understand the systems. Regulatory requirements and consensus standards were also considered. Finally, past assessments (i.e., OA-40 and LSO Configuration Management (CM) evaluations) were reviewed and corrective actions were evaluated.

Each team performed an end-to-end walkdown of the system being reviewed. The system walkdown provided confirmation that the system in the field was adequately and appropriately described in the system documentation.

The review identified both noteworthy practices and some common issues with the systems. Issues identified included the following:

- System Engineers are not well integrated into the work control process,
- System boundaries and interfaces are not always clearly described in the draft DSA,
- Master Equipment List detail is still a work in progress for the level of component definition,
- Key acceptance criteria are not always clearly identified in procedures, and
- System labeling (components) is weak.

The noteworthy practices that the team reported included:

- Red-lined drawings were completed and under formal change control/document control,
- System engineer knowledge of their respective systems is excellent, and
- System engineers identify improvement opportunities for systems.

Overall, the team felt that the joint reviews were cooperative and beneficial. The team concluded that the safety systems are highly scrutinized and the required surveillance and testing are being performed. Maintenance of the systems is also being performed appropriately. The team felt that Configuration Management application to the VSSs continues to improve. Red-lined drawings are complete and under document and change control, and procedures associated with surveillance, testing and maintenance have been updated and are under formal document control. The system engineers are now formally integrated into work control process through changes in the Work Control Manual, procedures, and other documents and participate at all levels. The team concluded that within the existing compensatory measures, the VSSs are capable of performing their safety functions.

VIII. MEMORANDUM OF UNDERSTANDING / AGREEMENT

In accordance with the requirements of the LLNL ES&H Manual, Document 51.4, *Startup and Restart of Nuclear Facilities* and LSO/LSOD-SOP-000162.02, *LSO Procedures for Startup and Restart of Facilities*, which implement DOE O 425.1 C at the site, it was determined that a Type 2 RA should be conducted prior to stand-up of the facility. The first step in this process is the preparation of a Memorandum of Understanding/Agreement outlining the requirements and expectations for the RA.

The MOU, executed on May 16, 2005, specified the development of a Readiness Plan to perform the RA, which will be approved by NNSA LSO. This RP, which has now been approved, follows the guidance in LLNL Document 51.4, Section 3.4.2. The MOU required that the RA ensure Compensatory Measures are properly implemented and are effective in addressing the safety management program deficiencies identified by the OA-40 report. It stated that a Criteria Review and Approach Document based approach will be used to assess applicable core requirements of DOE-STD-3006. The breadth of the review can be tailored as discussed in DOE Order 425.1.C.

The MOU outlined the pre-start requirements which must be met prior to the start of the RA as follows:

- Compensatory Measures for reduced B332 activity are implemented.
- An independent assessment of Administrative Control Programs (ACP) has been completed.
- Recovery plans and related Compensatory Measures for the seven TSR Administrative Control Programs have been developed, approved and are being implemented.
- Operational Safety Plans (OSPs) and/or other work control documents for each activity included on the reduced activity list are current and approved.
- The Facility Safety Plan and OSPs for each activity included on the reduced activity list have been reviewed against the Compensatory Measures and revised as necessary.
- The issues identified in letter LSONSID: 050034, C. Yuan-Soo Hoo to K. Perkins, dated February 18, 2005, have been addressed.
- Red-line drawings have been developed for all gloveboxes that are being exhausted by the Glovebox Exhaust System.
- Training for all B332 workers who will perform the reduced activities is current.
- The RP has been developed and approved.

The MOU identified the team leader and required the team leader select team members based on required areas of expertise and ensure the independence of the team members.

IX. LLNL MANAGEMENT SELF-ASSESSMENT

As a prerequisite to the commencement of a resumption of operations, LSO required that LLNL complete a MSA to assist in achieving readiness for the stand-up of operations. The MSA scope included those areas found to be lacking by OA-40 and a comprehensive evaluation of the effectiveness of the implementation of the safety basis and the associated administrative control programs described in Section 5 of the B332 TSRs.

The MSA was completed on July 25, 2005, and performed in accordance with a formal plan (readiness plan) developed by the MSA team leader and approved by the B332 Facility Manager. The MSA readiness plan included a set of CRAD documents that comprehensively covered the planned scope.

The MSA consisted of two parts. The first part of the MSA was an independent assessment of each of the 17 TSR administrative control programs. The second part of the MSA was an assessment of the facility against the core requirements of DOE Order 425.1C, *Startup and Restart of Nuclear Facilities*. This latter part of the assessment used input from the first part plus additional reviews by the MSA team. The second part of the MSA also verified that compensatory measures for OA-40 findings were properly implemented.

The TSR administrative control program assessments were conducted by a team of independent, experienced evaluators with technical competence in their assigned topics. The MSA identified both findings and observations. Each issue has been categorized as either a pre-start issue requiring resolution prior to stand-up of reduced activity, a pre-start issue requiring a compensatory measure prior to reduced activity, a post-start issue, or an issue that is an opportunity for improvement.

The MSA report concluded that certain administrative control programs, such as criticality safety, are well-developed and are mature in their implementation. A majority of the administrative control programs meet the TSR requirements, but are in need of improvement. The following administrative control programs were assessed by the MSA team as not meeting the TSR requirements: procedures, USQ program, fire protection, radiation protection, maintenance, CM, and QA. With the exception of the fire protection program, these TSR administrative control programs were previously declared deficient and reported as TSR violations. Compensatory measures have been defined and implemented to allow the performance of reduced activity. The MSA report stated the team has verified that these compensatory measures are in place. The report also notes the MSA team was involved in the confirmation of the effectiveness of corrective actions from the OA-40 Inspection Corrective Action Plan, TSR Recovery Plan, and corrective actions resulting from the MSA that have already been completed.

In their report, the MSA team stated they had observed marked improvement in the ability to produce continuous improvement and the facility's ability to perform the mission safely. The report also stated the team's belief that there has been significant progress in achieving clear roles and responsibilities and notable improvement in the effective use of procedures. The team concluded that upon closure of the pre-start issues, the Nuclear Materials Technology Program (NMTP) is prepared to resume operations without posing an undue safety, security, or compliance risk.

Based on completion of the MSA, the LLNL Facility Manager issued a "Readiness to Proceed" memorandum on August 12, 2005, and the Readiness Assessment commenced on August 15, 2005.

X. LLNL READINESS PLAN

A RP was developed by LLNL and approved by LSO on July 1, 2005. The objective of the plan was confirming that resumption of a defined set of reduced activities in B332 can be safely conducted based on the state of readiness of personnel, procedures and equipment related to the activities. A detailed list of work activities which would constitute the scope of the review is included. The RP outlines how the guiding principles and core requirements from DOE O 425.1 C will be addressed and states their applicability to this review. The Plan reiterates the pre-requisites from the MOU discussed above and adds three additional requirements to starting the review:

- the MSA is complete,

- an up-to-date list of compensatory measures is provided to the RA Team Leader, and
- Line management provides a declaration of readiness.

The Plan identifies the team members for the LLNL RA and their assignments and includes a summary of team qualifications and the basis for their independence. A total of 18 detailed CRADs for 9 focus areas are identified, including Management, CM, Maintenance, Occurrence Reporting, Procedures, QA, Radiation Protection, Safety Analysis, and Work Control. The expectations for the findings' classification and resolution are discussed, and the required content of the final report is outlined as follows:

- A summary of the review, findings, and readiness determination;
- An introduction that provides background information, the purpose of review, and the scope of the RA;
- An evaluation section that discusses each functional area and conclusion as to the readiness for each area;
- A dissenting opinions section that provides the individual team members an opportunity to voice concerns they feel were not adequately addressed in the report;
- A section that identifies problems and/or successes that could be relevant to the resumption of full operations (anticipated to occur toward the end of calendar year 2005); and
- Appendices containing all Form 1s and Form 2s.

XI. LSO READINESS PLAN

A LSO Readiness Plan to guide the RA process was developed and approved on August 12, 2005. The scope of the LSO RA is described as focusing on two areas:

- Provide oversight of the LLNL RA team to ensure the LLNL team is adequately verifying that the compensatory measures and/or corrective actions are properly implemented and are effective in addressing the identified deficiencies, and
- Review LSO readiness to provide oversight by following up on the specific deficiencies identified for LSO, and determining whether adequate LSO staffing is in place to oversee B332 operations.

The RA Plan identifies the team members for the LSO RA and their assignments and includes a summary of team qualifications and the basis for their independence. The Plan notes the LSO Team may identify problems or issues the LLNL team does not. The team may also disagree with the details of a finding from the LLNL team, such as the level of severity or whether it is a pre-start or post-start finding. The Plan states that when this occurs, the LSO team will identify a finding or findings which will supplement those identified by the LLNL team. The LSO team will not report findings for those issues which the LLNL team has properly identified. The LSO team may also report findings

related to its review of the LSO readiness. The Plan discusses the finding classification and resolution process and the reporting requirements for the team.

XII. LSO MANAGEMENT SELF-ASSESSMENT

In response to the findings from the OA-40 review, LSO assembled a small team to perform a root cause analysis. The purpose of the team was to identify root causes to aid in the development of a comprehensive CAP. The ultimate goal is to prevent recurrence of issues identified during the OA-40 inspection by completing the corrective actions identified as a result of this process.

After completing a cause tree analysis for each of the eleven primary barriers, the team determined the root cause of many of the findings from the OA review could be traced to the lack of a management system or mechanism to establish a clear set of priorities and then link this work to a system of accountability. By the establishment of priorities, the team was referring to two actions; the determination of what work is critical to the success of the office and the setting of work tasks such as reporting, conducting of reviews and appraisals, inspections, etc. A contributing cause for the findings was the culture of the office. Corrective actions for these root causes were developed and initiated. More specifics on the LSO actions taken to enhance the effectiveness of federal oversite are included in the Appendix.

A review of the LSO management systems and operational awareness activities was performed in preparation for resumption of limited activities in B332. This review focused on LSO's progress in addressing OA-40 issues related to federal oversight. Specifically, the self-assessment evaluated LSO personnel's adherence to the Operational Awareness Implementation Plans (OAIP) and the technical qualifications of LSO staff and management to adequately perform their oversight functions. The self-assessment also examined progress in addressing the findings from the OA-40 audit and the 2003/2004 ES&H Self-Assessment and the associated implementation of corrective actions.

The LSO management self-assessment plan outlines the following criteria to be used for the evaluation:

- Operational Awareness requirements for B332 are established.
- All B332 safety systems have assigned safety system oversight personnel.
- Facility representatives, safety system oversight personnel, and Subject Matter Experts (SME) are performing operational awareness activities at B332 in accordance with the requirements.
- Personnel who provide oversight, direction, or guidance to LLNL for B332 operations are qualified in accordance with the NNSA Technical Qualification Program (TQP) plan or have appropriate compensatory measures in place.
- Management is monitoring operational awareness activities in B332 to ensure adequate technical quality and that appropriate corrective actions are taken.

- LSO CAP action items in response to the OA-40 Inspection Report have been adequately completed or are on schedule to meet milestone dates.

The self-assessment identified a number of strengths as well as a few issues/concerns and areas for improvement. The report stated since the OA-40 audit was completed, LSO has taken many positive steps to address the issues brought up in their report and to improve the ability of LSO to oversee LLNL activities. The report concluded that based on the documents reviewed and interviews performed, LSO has and will continue to strengthen oversight activities in B332.

XIII. SPECIFIC AREAS OF CONCERN

The Board's March 8, 2005, letter listed ten issues of concern and requested that each be specifically addressed. The Appendix of this report addresses each of those ten issues in more detail including the current status of each.

XIV. MANAGEMENT AND SUSTAINABILITY OF CHANGE

Both LSO and LLNL senior management recognize many of the issues identified with the operations associated with B332 cannot be resolved quickly. Issues such as CM, conduct of operations, compliance with procedures, etc., are systemic problems that will take a long-term focus to correct. In many cases, nothing less than a cultural change will be required of the operating personnel of the facility. LSO and LLNL recognize the need to raise the expectations for safety professionals and develop, in detail, more fully defined roles and responsibilities. Management is working to create a culture of safety and compliance to prevent the recurrence of problems and has set a goal of operational excellence.

To maintain a discipline to operations, a Conduct of Operations manual has been written and approved. All staff assigned to B332 are being trained on its requirements. Management presence in the facility is being significantly increased. LLNL is developing a "walk around" requirement for its senior managers to increase their awareness of facility operations and to reinforce to the staff the importance of the safety culture.

An important step in this process has been the addition of resources to the facility management. In order to better support B332 operations in the future, LLNL has added a CM Manager, a Work Control Manager, six System Engineers, six Safety Analysts, and a Procurement QA specialist.

LLNL is restructuring how these resources and work are being managed in the Superblock. LLNL management has developed and implemented a resource-loaded schedule, software-based project plan to ensure the workforce is adequate and appropriately focused. This plan captures significant work efforts, including issues of specific concern to the DNFSB such as configuration management, and will ensure sufficient resources are working on high priority safety issues. These priority issues

include maintaining B332 in a safe condition, making progress on the TSR recovery plan and OA-40 CAP, developing the resource-loaded schedule for CM, and completing the DSA process. This plan allows visibility and accountability for milestones to senior LLNL and NNSA management.

XV. CONCLUSION

Significant progress has been made towards addressing safety issues since a programmatic stand-down of B332 operations was declared on January 15, 2005. Compensatory measures have been identified and put in place and corrective actions are underway that will allow safe operations to be performed at a reduced level. The VSSs for B332 have been confirmed as capable of performing their safety functions. A comprehensive MSA has been completed by LLNL. Recovery plans for the TSR Administrative Control Programs have been developed and many of the actions are already complete. Both LSO and LLNL have made critical management and process changes which will improve oversight and foster an environment of operational excellence in the future.

Readiness to resume limited programmatic operations is being confirmed by a RA performed consistent with the requirements of DOE O 425.1C with LSO providing oversight.

Following a successful RA process, LSO has determined that intermediate operations at B332 can be safely resumed.

APPENDIX

Specific Concerns Identified in the March 8, 2005 Letter

- **How the conditions of the facility's Authorization Agreement, particularly those concerning the safety management program administrative controls, will be met.**

  LLNL submitted to LSO for review and approval a revised Corrective Action Plan (CAP) in response to the OA-40 assessment on April 15, 2005 and LSO approved the CAP on April 20, 2005. This CAP addresses those individual subsections of Section 5 of the Authorization Agreement (AA) that have inadequacies and associated TSR violations. Compensatory measures were put into place until recovery plans and corrective actions were developed and implemented. Implementation of the OA-40 CAP, TSR recovery plans and LSO directed compensatory measures as required will bring the facility back into full compliance with the AA. LSO received comments on the final Action Plan from OA-40, and LLNL has responded to the comments. LLNL and LSO will continue to work closely with OA-40 on the CAP.

- **The recovery plans necessary to ensure the seven deficient safety management programs will once again be effective.**

  LLNL submitted Recovery Plans for the TSR violations on March 11, 2005, and have worked to integrate these plans with the OA-40 CAP. LSO has reviewed these plans and identified some potential gaps. LSO has approved the plans with the direction that LLNL complete seventeen additional recovery actions for B332 TSR violations in seven administrative control programs. The status of the recovery plans is as follows:
    - Configuration Management - 7 of 8 actions complete
    - Procedures - 8 of 12 actions complete
    - Quality Assurance - 6 of 11 actions complete
    - Radiological Protection - 11 of 14 actions complete
    - Unreviewed Safety Questions - 7 of 9 actions complete
    - Maintenance - 3 of 8 actions complete
    - Occurrence Reporting - 3 of 5 actions complete

  As a result of the MSA, an eighth programmatic TSR violation was declared for the Fire Protection Administrative Control Program. LLNL has submitted a recovery plan which includes 15 actions to be taken and the applicable compensatory measures. The most significant one of the recovery actions, a test of the fire protection check valves, has already been completed. Compensatory measures will remain in place to ensure effective safety coverage while the remaining actions are completed.

- **How the requirements of Department of Energy Order 425.1C, *Startup and Restart of Nuclear Facilities*, will be met.**

  On January 15, 2005, B332 programmatic activities were placed in stand-down status to enable the organization to better focus efforts on developing near term compensatory measures and corrective actions to address issues raised by the OA-40 review.

  As the facility begins the process of a transition to a resumption of limited activities as well as full activities, LSO and LLNL recognize the value of following a formal, well-defined process to verify the adequacy and implementation of compensatory measures and corrective actions and confirm the readiness of the operations.

  DOE O 425.1(c) is implemented at LSO through the Standard Operating Procedure LSO/LSOD-SOP-000162.02 and at LLNL through the provisions of the LLNL ES&H Manual, Volume 5, Part 51. LSO and LLNL plan to conduct a RA prior to LSO authorizing intermediate level and full activities in accordance with the requirements and procedures in these documents.

  As the first step in this procedure, LSO and LLNL have developed a MOU which will guide the readiness process. As discussed in Section VI of this report, the MOU details the prerequisites for starting the review, including that the compensatory measures have been fully implemented, an independent assessment of the Administrative Control Programs has been completed, and Operational Safety Plans and other work control documents are current and approved. On June 14, 2005, LSO received the LLNL Readiness Plan for the RA. After reviewing it to verify it meets the expectations detailed in the MOU, LSO approved the Plan.

  Both LLNL and LSO now have approved Readiness Plans which outline how the guiding principles and core requirements from DOE O 425.1 C will be addressed and state their applicability to the review. These plans are discussed in more detail in Sections IX and X of this report.

- **The approach and schedule for resolving the potential inadequacies in safety analysis that relate to safety systems.**

  LLNL has completed most of the USQ Determinations and Evaluations of Safety of the Potentially Inadequate Safety Analyses (PISA) as shown in the Attachment to this report. In addition, the Attachment shows the status and schedule for resolving the remaining PISAs. LSO, with support from the NNSA Service Center, is reviewing the evaluations of Safety for the PISAs. No specific schedule has been established for completing the remaining evaluations. They will be completed as expeditiously as priorities allow.

- **The approach and schedule for resuming programmatic operations in the Plutonium Facility.**

  A three-phased approach is being used for resuming full programmatic operations. Operations in B332 are currently in stand-down.

Stand-down of Operations - Initiated January 31, 2005. The following actions have been completed: 1) Immediate compensatory measures approved; 2) Limited scope of work that must continue for the safety and security pre-approved (material, control and accountability measurements, surveillances, safety walkthroughs, alarm response, etc); and 3) Additional work approved on a case-by-case basis.

Limited Operations – Limited operations includes most of the scope of work requested to be resumed in the LLNL letter dated February 9, 2005, and will begin when the following activities have been completed: 1) Interim compensatory measures in place with residual vulnerabilities clearly identified; 2) Readiness for limited operations has been confirmed; and 3) Predetermined, reduced, intermediate scope of work approved.

Full Operations - A return to full operations will begin when the following activities have been completed: 1) The majority of compensatory measures are no longer required; 2) Safety management programs are again operating effectively; 3) Readiness for full operations confirmed; and 4) Full programmatic scope of work re-authorized. Resumption of full activities in B332 is currently projected for June 2006. The specific process leading to a resumption of full operations will be further defined following the resumption of limited operations.

- **Actions to be taken by NNSA to enhance the effectiveness of federal oversight at the Plutonium Facility and minimize the possibility of a recurrence of the identified problems.**

Extensive actions have been taken or are underway to enhance oversight, both at the Headquarters level and locally at the site. At Headquarters, a Chief of Defense Nuclear Safety (CDNS) has been established. The CDNS and NA-10 have been kept informed of the status of B332 issues. The CDNS and staff visited the LLNL site on January 12-13, and July 6-7, 2005. They received progress briefings on OA findings, CM issues, the LSO federal oversight program, and toured B332. The CDNS will perform a management review of LSO in the second quarter of FY06. At the site, LSO has taken the following actions to strengthen federal oversight:

- LSO is evaluating LSO oversight processes, feedback and improvement mechanisms. LSO is working with NNSA HQ to establish funding to support the use of outside mentors to aid in this process.

- Appointed two permanent Assistant Managers; two new Team Leaders, and two new Operations Team Leaders to clearly define line management responsibilities and accountability for these functions. The Operations Teams are the mechanism employed to raise the awareness and accountability of program/project managers with respect to facility operations and safety of operations.

- Promoted a qualified Facility Representative to be Team Lead for the Facility Representatives, hired two additional Facility Representatives and a Safety Systems Engineer; and is reviewing Facility Representative assignments.

- Completed Self-Assessments of the LSO Technical Qualification Program, the LSO Criticality Program, the Nuclear Safety Basis, and the LSO Safety System Oversight Program and is scheduling a comprehensive self-assessment of the LSO Facility Representative Program.

- Performed an initial assessment of configuration management of the B332 VSSs. Completed joint LSO/LLNL comprehensive assessments of the B332 VSSs based on the results of the initial assessment, OA-40 assessment, and system engineer walkdowns.

- Completed a "For-Cause" Review of the LLNL radiation safety program.

- Developed and is implementing a detailed response to the OA-40 inspection findings and root cause analysis, such as a management system including a critical work list, updated position descriptions and increased accountability through specific performance elements, a master ES&H self assessment schedule and complete actions from previous assessments, upgraded requirements in the Operational Awareness Standard Operating Procedures, and training/mentoring staff on performance of operational awareness activities.

- Several key personnel recently attended the DOE Safety System Oversight training at the National Training Center; currently scheduling training for additional personnel.

These changes will significantly strengthen the effectiveness of Federal oversight. LSO will also continue to evaluate other opportunities for enhancing oversight.

- **NNSA's basis for determining that the proposed compensatory measures provide a level of safety systems for which they are compensating.**

Following the "stand-down" of programmatic activities in B332, LLNL provided proposed compensatory measures for continuing with the scope of work necessary for limited activities at the facility critical to ES&H and Security. LSO has completed a crosswalk of these measures against the known deficiencies of the LLNL system to determine that adequate coverage has been provided for the limited scope of work proposed.

LSO reviewed interim compensatory measures proposed by LLNL on February 9, 2005 as a basis for the resumption of limited programmatic activities. LSO has prepared a similar crosswalk for the interim compensatory measures and requested additional technical justification be provided on several key issues. LSO evaluated the additional information received to determine if the interim measures provided an adequate level of safety. Seventeen additional compensatory measures were identified for the TSR Recovery Plans and additional compensatory measures were identified for the PISAs.

- **For each of the deficient administrative control problems, the residual risk involved in operating with compensatory measures instead of the fully implemented administrative program.**

  Seven Administrative Control Programs were found to be deficient resulting in programmatic TSR violations. The approved B332 safety basis credits administrative control programs for mitigation. Residual risk has been qualitatively assessed through the crosswalk process discussed above and vulnerabilities identified for each ACP. LSO reviewed the vulnerabilities to determine what, if any, additional interim compensatory measures are required. As discussed, LSO reviewed the TSR recovery plans developed by LLNL and identified some potential gaps. LSO has approved the plans with the direction that LLNL complete seventeen additional recovery actions for B332 TSR violations in seven administrative control programs.

  As a result of findings developed during the LLNL MSA, an eighth program, Fire Protection, was declared to be deficient in the area of maintenance and testing. A recovery plan for this TSR program was developed by LLNL and submitted on August 9, 2005. LSO has determined the compensatory measures already in place are sufficient to ensure the safety of this program until the corrective actions are completed.

- **The process to be used to verify the implementation of the proposed compensatory measures.**

  As previously discussed, LSO and LLNL plan to resume full activities in accordance with the requirements and procedures in the LSO SOP and ES&H manual which implement DOE O 425.1C. Prior to declaring their readiness for intermediary work scope, LLNL completed a MSA to verify there are no unknown problems with the safety systems and programs, and that the intermediate compensatory measures are in place and provide an acceptable level of risk for the proposed operations. The MSA team also verified the closure of the pre-stand-up findings they identified prior to the declaration of readiness. This will be confirmed by the RA process. Additionally, the Joint LSO and LLNL VSS reviews evaluated the safety systems operability and determined that all systems were operable and no additional compensatory measures were required.

- **NNSA's assessment of the condition of safety management programs mandated by the Technical Safety Requirements at the other defense nuclear facilities at LLNL.**

  LSO has required LLNL to conduct an "extent of condition" evaluation of all nuclear facilities for the findings identified during the OA-40 Inspection, and this evaluation is currently underway. Corrective actions will be developed for all issues identified during "extent of condition" evaluations. Many of the safety improvements currently being initiated at B332, such as the conduct of operations program and CM improvements, will also flow down to the other defense nuclear facilities at LLNL. LSO and LLNL will continue to evaluate the effectiveness of safety management programs through periodic reviews such as those for Radiation Protection, USQ process, and Maintenance. These

evaluations and reviews will be performed by LSO and LLNL independently of the activities leading up to a resumption of B332 programmatic activities.

ATTACHMENT

Status of B332 PISAs Associated with OA-40 Report						
OR #	Notification Date	Title	Comp. Measures	USQD Date/Status	EOS Date	EOS Status with LSO
2004-0050	10/25/2004	PISA - Available Water Flow to the HEPA Filters and Deluge for Increment 3	Thermal analysis completed - results indicate meet DOE-STD-1066-99	11/22/04 - Positive	12/6/2004	LSO reviewing EOS
2004-0051	10/25/2004	PISA - Emergency Water Supply to the Increment 1 Room Exhaust HEPA Filters	Thermal analysis completed - indicate exhaust air mixing results in acceptable temperature of air at HEPA filters of 42C	12/10/04 - Positive	11/18/2004	EOS review completed 7/7/05
2004-0053	10/26/2004	PISA - Failure to Surveil Two Check Valves in the Emergency Water Supply	EOS evaluated potential failure of check valves along with loss of normal water and fire - results were beyond extremely unlikely (under LSO review); Also, limited activities in B332.	1/7/05 - Positive	1/7/2005	On 2/14/05, LLNL submitted to LSO a Fire Suppression System Check Valve Plan. LSO reviewing EOS and Check Valve Plan (Lee). A new USQD (positive) was reported to DOE and an EOS is being prepared to address 7 additional check valves.
2004-0054	10/26/2004	PISA - Increment 3 Room Ventilation Supply Low Flow Control	NMTP performed a test that demonstrated the ability of the Increment 3 Room Ventilation System supply to adequately throttle flow to maintain building pressure within TSR limits; Also, limited activities in B332.	4/6/05 - Positive	4/6/2005	LSO reviewing EOS

Status of B332 PISAs Associated with OA-40 Report (cont.)						
OR #	**Notification Date**	**Title**	**Comp. Measures**	**USQD Date/Status**	**EOS Date**	**EOS Status with LSO**
2004-0055	10/27/2004	PISA - Corridor to Outside Pressure Differential	Limited activities in B332; Also, must provide technical basis prior to increasing material at risk (LSO 2/18/05 letter)	5/12/05 - Negative	5/9/05	LSO reviewing EOS
2004-0056	10/27/2004	PISA - Basement Water Tank Pressure Blanket Requirement Less in SAR than Required by NFPA	Intent of NFPA requirement currently being met as tank pressures are greater than 75 psi; Weekly surveillances. Also, limited activities in B332.	11/24/04 - Positive	2/28/2005	LSO reviewing EOS
2004-0061	11/8/2004	PISA - Performance of HEPA Filters in Smoke Conditions	LLNL has completed an engineering note on this issue which concluded that HEPA filters will survive smoky conditions. Document under review by LSO. Also, limited activities in B332.	3/11/05 - Positive	3/31/2005	LSO reviewing EOS
2005-0014	2/9/2005	PISA - Sample Preparation OSP	Activity has been suspended	4/6/05 - Negative	4/6/2005	LSO reviewing EOS
2005-0015	2/10/2005	PISA - Machine Lapping OSP	None	3/17/05 - Negative	3/17/05	LSO reviewing EOS

Status of B332 PISAs Associated with OA-40 Report (cont.)						
OR #	**Notification Date**	**Title**	**Comp. Measures**	**USQD Date/Status**	**EOS Date**	**EOS Status with LSO**
2005-0016	2/10/2005	PISA - Minimum Pressure Requirements for the Nitrogen Backup Tanks	LLNL determined and documented the minimum pressure required (1000 psig) in the backup nitrogen tanks and confirmed that the actual pressure is greater (about 1700 psig), weekly surveillances	4/18/05 - Positive	3/10/05	LSO reviewing EOS
2005-0017	2/10/2005	PISA - Emergency Water Supply to the Increment 3 Glovebox Exhaust Plenums	Limited activities in B332, semiannual testing of GBES thermal bulbs	USQD not yet completed	EOS not yet completed	Awaiting submission
2005-0020	2/18/2005	PISA - Nitrogen Pressure Control Valves and Check Valves in the Fire Suppression System	Limited activities in B332	6/22/05 - Negative	6/2/05	LSO reviewing EOS
2005-0025	3/8/2005	PISA - Basis for Minimum Staffing	Facility operator 1 hr. response	6/8/05 - Negative	6/3/05	LSO reviewing EOS
2005-0026	3/8/2005	PISA - Surveillance Requirement for the Increment 3 Room Filter Bypass Dampers	Limited activities in B332, removal of excess combustibles	6/22/05 - Positive	6/16/05	LSO reviewing EOS