Criticality Safety Assessment Program
for
Defense Nuclear Facilities Safety Board
Recommendation 94-4
Deficiencies in Criticality Safety
at Oak Ridge Y-12 Plant

July 1995

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Recommendation 944
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at Oak Ridge Y-12 Plant

Approved by:

Milton Haas, EH-34 July 11, 1995
Co-Team Leader

Jim Winter, DP-31 July 11, 1995
Co-Team Leader

ACRONYMS

ANL	Argonne National Laboratory
ANS	American Nuclear Society
ANSI	American National Standards Institute
CMS	criticality accident alarm system
CoO	Conduct of Operations
CS	criticality safety
CSA	criticality safety approval
DNFSB	Defense Nuclear Facilities Safety Board
DOE	Department of Energy
DOE-HQ	Department of Energy Headquarters
DP	Office of Defense Programs
EH	Office of Environment, Safety and Health
ESS	Energy Systems Standard
LANL	Los Alamos National Laboratory
LMITCO	Lockheed Martin Idaho Technology Company
LLNL	Lawrence Livermore National Laboratory
LMES	Lockheed Martin Energy Systems, Inc.
M&O	Management and Operations

NCS	nuclear criticality safety
OSR	operational safety requirements
OR	Oak Ridge Operations Office
PHL	Pacific Northwest Laboratory
SAIC	Science Applications International Corporation
SAR	Safety Analysis Report
SNL	Sandia National Laboratory
SMS	Systematic Management Systems
USQD	unreviewed safety question determination
WHC	Westinghouse Hanford Company
WSRC	Westinghouse Savannah River Company
Y-12	Oak Ridge Y-12 Plant
YSO	Y-12 Site Office

Preface:

This Assessment Program is intended to support the Department of Energy (DOE) Implementation Plan in response to the Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 94-4, *Deficiencies in Criticality Safety at Oak Ridge Y-12 Plant.* The program provides guidance for performing two independent evaluations. One involves operational safety requirements (OSR), criticality safety approvals (CSA), and procedures that support OSRs and CSAs. The other focuses on the Criticality Safety Program at Y-12. The reviews will examine the effectiveness of procedural controls, the ability of criticality safety approvals, and whether the root causes of noncompliance were correctly identified in the pre-resumption reviews. Team members should use this program to evaluate the actions completed to date at the Y-12 Plant and the long-term posture of the operating contractor, Lockheed Martin Energy Systems, Inc. (LMES) and the Department of Energy (DOE) Oak Ridge Operations Office (OR) related to the adequacy and execution of the upgraded CSA and OSR procedures and the Criticality Safety Program.

The primary purpose of these evaluations is to help the site identify deficiencies and corrective actions associated with OSR and CSA compliance and the Criticality Safety Program at Y-12. The recommendations identified in the final report should be useful, manageable and intended to support institutional improvements. The recommendations should promote a positive standards-based, compliance culture that corrects the root causes of previously identified deficiencies. Return visits to the site may be required in order to help the site determine the effectiveness of the corrective actions associated with these assessments.

All parties should recognize that the assessment is an integral part of the Department's commitment to ensure the safety of workers, the public and the environment. All personnel involved in the assessment activity should share that common goal.

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1.0 Assessment Overview

The DOE Office of Defense Programs (DP) and the Office of Environment, Safety and Health (EH) will conduct joint assessments of the Oak Ridge Y-12 Plant during the Fall and Winter of 1995-1996. The assessments are in response to DNFSB Recommendation 94-4, *Deficiencies in Criticality Safety at Oak Ridge Y-12 Plant*. DP and EH will be co-leaders of a team of experts Management and Operations (M&O) contractors and consultants, specializing in criticality safety and operations. The team members will evaluate how well the Oak Ridge facility is complying with the OSRs and CSAs, perform a comprehensive review of the Criticality Safety Program at Y-12, and evaluate how the experience gained from similar reviews at the Pantex Plant, Rocky Flats Site, the Sequoyah Fuels Corporation, and the Los Alamos TA-55 facility can be applied to the Y-12 Plant. In addition, the team will review previous CSA and OSR compliance assessments including findings and root cause determinations and will independently assess these areas. This program defines the scope, outlines roles and responsibilities, provides appropriate project management, and supplies the performance objectives, review criteria and approach for the assessment. A peer review team of nationally recognized experts in the field of criticality safety and operations reviewed and commented on the Assessment Program.

The assessment will be conducted in two phases: an independent evaluation of OSRs, CSAs, and safety significant procedures; and a comprehensive review of the criticality safety program at Y-12. The results from each phase of the assessment will be documented in separate reports and provided to the DOE 94-4 Senior Steering Committee. Once that committee concurs with the reports, it will submit them to the Defense Nuclear Facilities Safety Board to satisfy a Recommendation 94-4 Implementation Plan commitment.

2.0 Introduction

On September 27, 1994, the DNFSB issued Recommendation 94-4, which involved criticality safety deficiencies observed at the Oak Ridge Y-12 plant. The Recommendation described a September 22, 1994, event in which members of the DNFSB staff noted discrepancies between the CSA requirements and the configuration of storage arrays while observing the unloading and storage of a weapon component. In responding to this identified violation of nuclear criticality safety limits, DOE and contractor personnel failed to take appropriate corrective actions in accordance with site procedures. Following the event, the operating

contractor, LEMS, stopped all nuclear operations at the Y-12 Plant.

The DNFSB Recommendation stated that reviews of adherence to nuclear criticality safety limits at the Y-12 Plant revealed widespread noncompliance. The Recommendation also identified weaknesses in key areas of the criticality safety program including procedures and conduct of operations, as well as DOE and contractor experience, training, qualifications and performance. In response to the DNFSB Recommendation, DOE established a Senior Steering Committee and Senior Working Group to develop an overall strategy. In February 1995, DP issued the *Department of Energy Implementation Plan for Defense Nuclear Facilities Safety Board Recommendation 94-4, Deficiencies in Criticality Safety at the Oak Ridge Y-12 Plant.* The Implementation Plan describes plans and schedules for the phased resumption of activities at the Y-12 Plant. The following tasks were identified as part of the Implementation Plan:

- Task 1 - Organization
- Task 2 - CSA/OSRs
- Task 3 - Criticality Safety
- Task 4 - Conduct of Operations
- Task 5 - Technical Competence
- Task 6 - Corrective Actions
- Task 7 - Reporting Requirements
- Task 8 - Change Control

This Assessment Program evaluates the long-term programmatic improvements associated with Task 2, *CSA/OSRs*, and Task 3, *Criticality Safety*. The activities of Tasks 2 and 3 will be coordinated with those of Task 4, *Conduct of Operations*, and Task 5, *Technical Competence*.

A glossary of definitions specific to this assessment are include at the end of this plan.

3.0 Purpose

This Assessment Program provides the approach and guidelines for the independent assessments described in the Implementation Plan. The assessment evaluates whether the Oak Ridge facility is sustaining resumption oriented commitments and whether the facility's longer term plans are consistent with Recommendation 94-4 and related LMES commitments already specified in the Task 2 portion of the Implementation Plan. The assessment will focus on the site's implementation of CSAs, OSRs, and the effectiveness of the Criticality Safety Program. The performance objectives for the Criticality Safety Program review will include staffing levels and qualifications; maintenance and change control programs; criticality safety evaluation processes including administrative controls and implementing procedures; and compliance with applicable DOE Orders governing criticality safety. A part of this assessment will also address the effectiveness of specific training on criticality safety. For each phase of the assessment, the team will prepare a final report that documents observations and suggests corrective actions.

4.0 Objective and Scope

The objectives of the Assessment Program are to perform an independent assessment of

OSRs, CSAs and safety significant procedures, and conduct a comprehensive review of the Y-12 Criticality Safety Program. The Implementation Plan addresses these objectives as Task 2 and Task 3. This program provides effective methodology for accomplishing these tasks. The activities of Task 4, *Conduct of Operations*, will be coordinated with activities in this plan. The training process (e.g., methodology, instructor qualifications, etc.) will not be addressed as part of this program because it is being addressed in Task 5. However, the assessment will evaluate the technical content and effectiveness of specific training on criticality safety.

The assessment team will achieve these objectives through observations of facility activities, interactions with site personnel, review of procedures, review of corrective action, tours of facilities, and inspections of equipment. In addition, the team members will evaluate how experience gained from similar reviews conducted at the Pantex Plant, Rocky Flats Site, the Sequoyah Fuels Corporation, and the Los Alamos TA-55 facility can be applied to the Oak Ridge Y-12 Plant. Appendix A, *Proposed Facilities List*, provides a preliminary listing of the facilities to be included as part of this Assessment Program. The team leaders will decide which facilities should be assessed.

The following additional items are part of the Assessment Program:

- DOE and contractor management of criticality safety programs
- Applicable portions of completed Readiness Assessments
- Evaluation of completed actions in Near-Term Initiatives for Nuclear Criticality Safety
- Evaluation of corrective actions related to probable causes documented in Type C Investigation
- Evaluation of corrective actions related to causal factors in the LMES internal report, *Evaluation of Criticality Safety Discrepancy Data*
- Assessment of progress by LMES in Phase III and IV activities involving criticality safety as defined in Y/AD-623, *Plan for Continuing and Resuming Operations*
- Any Special Operations that may be in progress at the time of the site visits. These include both one-time operations and those that will become part of standard operations as they are resumed.

Upon completion of each assessment, the team will prepare a final report documenting the findings, concerns, and noteworthy practices.

5.0 Team Composition

PEER REVIEW TEAM

B. Briggs, LMITCO - Criticality Safety

I. Fegus, EH-34 - Criticality Safety

J. Grise, Consultant - Operations

J. Pearson, LLNL - Criticality Safety

5.1 Peer Review Team

A peer review team of nationally recognized experts in the field of criticality safety and operations and the members of the assessment team reviewed and commented on the assessment program. Appendix B, *Peer Review and Assessment Team Members Biographical Summaries*, summarizes the technical qualifications of each team member. The peer review team helped develop the performance objectives, review criteria and approach. Additional attendees a the Peer Review meeting included

M. Haas, EH-34, Assessment Co-Team Leader
J. Winter, DP-31, Assessment Co-Team Leader
W. Andrews, DNFSB Staff
R. Felt, EH-34
S. Puchalla, DP-24, Working Group Representative
S. Rosenbloom, EH-34
P. Ward, Consultant-Scientech, Facilitator
M. Williams, EH-3, Steering Committee Representative

5.2 Assessment Team Members

Members of the assessment team were selected on the basis of technical expertise, assessment experience, and knowledge of specific disciplines. The use of team members from a number of DOE sites promotes the exchange of good practices, lessons learned and diverse perspectives. These individuals are familiar with assessment methodology and know-how to conduct interviews, observe in-progress activities, and perform walkdowns of facility systems equipment. The assessment of facility systems and equipment. The assessment team include DOE technical experts, senior M&O contractors, and highly qualified consultants.

In addition, personnel from DOE-HQ and Westinghouse Savannah River Company (WSRC) will participate in a training role and will be called upon to assist more experienced team members. Any observations or concerns that these DOE-HQ and WSRC team members raise will only be considered if validated by their senior mentor. These additional attendees include:

M. Crouse, WSRC

D. Galvin, DP-34

S. Rosenbloom, EH-34

Ms. Barbara Kneece, PNL, will provide administrative coordination.

ASSESSMENT TEAM MEMBERS

D. Friar, WHC - Criticality Safety

D. Heinrichs, LLNL - Criticality Safety

W. Hogle, Consultant/PNL - Operations

D. Outlaw, Consultant/SAIC - Criticality Safety

T. Reilly, WSRC - Criticality Safety

(Sub-Team Leader)

L. Restrepo, SNL - OSRs

M. Sharpsten, LMITCO - Safety Analysis

T. Taylor, LMITCO - Criticality Safety

S. Vessard, LANL - Criticality Safety

D. Vogt, Consultant/SAIC - Operations

A. Williams, Consultant/SAIC - Operations

(Sub-Team Leader)

6.0 Roles and Responsibilities

6.1 Team Leaders

The team leaders will be responsible for implementing this program and for managing the assessments. Prior to the onsite assessment, the team leaders will coordinate with OR and LMES personnel on logistics, required training, security access requirements, identification of counterparts, selection of facilities to be assessed, and assessment schedule. The team leaders will also be responsible for conducting the entrance and exit meetings with OR, Y-12 Site Office (YSO), and LMES personnel. The team leaders will be responsible for preparing briefings and ensuring development of the final report.

The team leaders will be responsible for conducting daily briefings with OR and LMES personnel to review observations, concerns and findings, and approve the daily schedule of activities with YSO and LMES (e.g., interviews, walkdowns, observations, and technical discussions). Team leaders will also be responsible for determining the validity of a finding identified by the team and resolving any conflicts between team members and OR and LMES personnel. The team leaders are responsible for collecting for use in the final report photographs and any pertinent reference materials. They are also responsible for coordination with Tasks 4 and 5.

6.2 Sub-Team Leaders

The sub-team leaders will be responsible for managing, on a daily basis, the conduct of the

assessment, the logistics of their sub-team, and the written input by their team members for both assessment forms and for the final report.

6.3 Assessment Team Members

The team members have the responsibility to conduct a comprehensive review based on the criteria specified in Appendix C, *Task 2 Performance Objectives, Review Criteria, Approach and Expectations;* and Appendix D, *Task 3 Performance Objectives, Review Criteria, Approach and Expectations*. The team members will review the results of prior assessments, focusing on LMES and Y-12 findings, corrective actions, interim actions and post-resumption activities. They will document their review on the Assessment Forms found in Appendix E, *Assessment Forms*.

During the onsite assessments associated with Task #2, the team will:

- evaluate facility compliance with the OSRs and CSAs,
- determine the root cause of any recently identified violations, and
- evaluate how the experience gained from similar reviews at the Pantex Plant, Rocky Flats Site, the Sequoyah Fuels Corporation, and the Los Alamos TA-55 facility can be applied to the Oak Ridge Y-12 Plant. (Refer to Appendix F, *Lessons Learned From Rocky Flats Building 771, Pantex, the Sequoyah Fuels Corporation, and Los Alamos*).

During the onsite assessment associated with Task #3, the team will:

- conduct a comprehensive review of the nuclear criticality safety program at the Y-12 Plant including procedural controls, the utility or nuclear criticality safety approvals, and the root cause analysis of the noncompliance found during recent reviews.

The team will accomplish these tasks by independent verification, direct observation of facilities (walkdowns), interviews with facility personnel, and review of documents and programs. Examples of background materials to be made available to the team members include the results of relevant prior assessments, the corrective action database, occurrence reports, root cause analyses, facility SARs, USQDs, OSRs, CSAs, criticality safety procedures, maintenance records, training records, etc. Additional reference materials are provided for team members in Appendix G, *DNFSB Recommendation 94-4, 93-6, and 92-5*.

Team members will be responsible for a daily summary of activities that will be provided to the sub-team leaders and utilized during the daily site management briefs and team meetings. The summaries will also be the basis for preparation of the draft report.

Additional team member responsibilities include the following:

- prepare and sign assessment forms,
- prepare assigned report sections,
- provide written descriptions of dissenting issues, and
- provide concurrence with the final report.

6.4 OR and LMES Personnel

OR and LMES personnel will be responsible for providing team members with site specific training and with the information they need for a comprehensive assessment. OR and LMES personnel will also be responsible for providing office spaces for use by the team.

OR and LMES personnel will be assigned as counterparts, responsible for providing technical assistance as requested by the team leaders. OR and LMES personnel will review the approved Assessment Forms and provide a response acceptance in Section IV of Assessment Form 2 (reference Appendix E). A signature line is provided for acceptance of the observation, concern or finding.

OR and LMES personnel, in conjunction with the team members, will then be responsible for establishing what corrective actions are needed to close any identified findings. In addition, OR will provide the team leaders with photographs of the site processes and other specified reference materials for use in the final report. OR and LMES personnel will arrange for secure environments and equipment to support reviews of classified documents and activities. This would include classification reviews of any materials that the team members take offsite during the course of the assessments of at the conclusion. This is discussed further in Section 7.4.

7.0 Site Assessment Team Process

7.1 Organization and Training

Prior to the onsite assessment activities, site personnel trained the assessment team so they have unescorted access to the Y-12 facility. Training included LMES General Employee Training, Radiation Worker II, Criticality Safety, Emergency Preparedness, and Hazard Communications. In addition, root cause analysis training will be provided to some of the team members. Team leaders will certify that each team member is technically competent and has no direct connection with Y-12 operations that could affect their independence.

7.2 Protocol

The assessment requires an open exchange of information between team members, OR, and LMES. Successful communication between these individuals should include the following:

- The team leaders should hold entrance meetings with OR and the contractor to discuss the objectives of the assessment and obtain OR and contractor perspectives on assessment activities. The team leaders will brief OR and site management on the scope, purpose, and objective of the assessments and will obtain the current status of Y-12 operations. OR should provide the team with a listing of technical and administrative contacts within the Field Office and contractor organization at the time of the meetings.

- The site should identify technical and administrative contacts within the Site Office and contractor organization to assist the assessment team. These contacts should facilitate information flow and logistics for the team.

- Candid discussions involving all parties are encouraged. However, information related to the formulation of observations, concerns, or findings will be formalized. Appendix E provides forms for this purpose. These forms will be administratively controlled to facilitate information flow and ensure that responsible elements in the Site Office and contractor organization are fully aware of, and involved i, responses to potential issues.

- Daily meetings should be held between the team leaders and facility management throughout the assessment. These meetings will be used to review observations, concerns and findings, and to arrange and schedule activities (e.g., interviews, walkdowns, observations, and technical discussions). Team leaders and team members should have daily meetings at the close of the business day to review assessment status and potential issues. The site's representatives are invited to attend these evening meetings. Published schedules should be used and activities planned to the maximum extent practical.

- At the end of the assessment, an exit meeting should be held between team members, Field Officer personnel, Site Office personnel and the contractor to ensure that the issues identified are correct and reflect the most up-to-date information available. The purpose is to identify any outstanding concerns and review any suggested corrective actions.

- All parties should recognize that the assessment is an integral part of the Department's commitment to ensure the safety of workers, the public and the environment. All personnel involved in the assessment activity should share that common goal.

7.3 Procedure

7.3.1 Planning Activities

The team has conducted a preliminary site visit (June 5-9, 1995) for training and to resolve any pre-assessment issues. During the preliminary visit, the team selected buildings to be assessed, and established lists of interviews, references and site counterparts. Training included LMES General Employee Training, Radiation Worker II, Criticality Safety, Emergency Preparedness, and Hazard Communications. Team members reviewed DNFSB Recommendations 94-4, 92-5, and 93-6 (refer to Appendix G); the DOE Implementation Plan; Y/DD 500, *The Y-12 Plant Nuclear Criticality Safety Program Description*; Y/AD-622, *Type C Investigation of the Y-12 Plant Criticality Safety Approval Infractions Event*; and other background information.

Team members were tasked with specific responsibilities within the Task 2 and 3 assessments and given opportunity to provide comments on this program during the preliminary site visit. Team leaders and sub-team leaders coordinated that review process.

7.3.2 Performance Objectives, Review Criteria, Approach and Expectations

The Assessment Program provides the necessary guidance for conducting the evaluations associated with Tasks 2 and 3. The expected deliverables are noted in Section 8.0. Appendices C and D contain the performance objectives, review criteria, approach, and expectations for

each assessment. The criteria developed provide the basis for the team to conduct their work within the defined scope of the assessments. The criteria were based on the expertise of team members and of the peer review group of nationally recognized experts. The review criteria provide for interviews with personnel, reviews of procedures and programs, walkdowns of systems, and observations of facility conditions. The team members will be provided with suggested lines of inquiry for each performance objective. These lines of inquiry are not part of this plan. Team members are to use them as guidance when conducting the assessment process but the suggestions are not to be construed as limiting areas of inquiry.

7.3.3 Assessment Forms

Appendix E contains the assessment forms to be used by team members for documenting their review. Assessment Form 1 will be used for documenting the detailed review of each objective. Assessment Form 2 will be used to identify findings, concerns, observations, or noteworthy practices. Team members will discuss with the team leaders and contractor representatives all issues raised prior to classification as a finding, concern or observation. Definitions of these and other terms and can be found in the glossary.

Completed forms should be clearly written and provide sufficient detail. Team members will submit assessment forms to the team leader for review and approval. The team leader will then submit the Assessment Form 2 to OR and LMES personnel for their response. OR and LMES personnel will be responsible for reviewing the approved Assessment Forms and providing a response and acceptance in Section IV of Assessment Form 2. In the event that OR or LMES does not accept a particular observation, concern, or finding, the team leaders will be responsible for facilitating resolution.

7.3.4 Document Reviews, Facility Walkdowns and Interviews

An initial tour of Y-12 facilities was conducted during the June 5, 1995, site visit to familiarize the team members with the layout of facilities. Team members reviewed some key documents during the site visit. During the assessments, team members may conduct additional walkdowns to identify and characterize issues and concerns. A facility representative knowledgeable of facility conditions or site counterpart should accompany team members during these walkdowns.

Interviews may be required in order to gather information of a specific topic. Interviews will be scheduled after the document reviews and initial facility walkdowns. The assessment team will prepare suggested lines of inquiry that may be used for guidance in these interviews.

7.3.5 Lessons Learned Review

The observations and lessons learned presented in Appendix F are from similar criticality safety events and resumption efforts at Rocky Flats Building 771, the Pantex Site, the Sequoyah Fuels Corporation, and Los Alamos TA-55. Summaries of the events and lessons learned are presented in Appendix F so that team members may determine how the lessons learned at these facilities apply to the resumption activities at the Y-12 Plant. Team members will have available the full assessment reports in order to gain a better understanding of the applicability of these lessons learned to the Y-12 Site.

7.3.6 Root Cause Analysis and Corrective Action Review

Team members will review the results of the LMES near-term initiatives that have been completed for criticality safety, focusing on the adequacy of the root causes analysis and corrective actions. The team members will also evaluate the corrective actions related to the probable causes documented in the Type C investigation (Y/AD-622). In addition, team members will conduct a root cause analysis on all recently identified violations.

7.4 Classified Information Security

Some of the information needed to complete this assessment may be classified. This assessment will report as much information as possible in an unclassified form. All materials generated onsite (e.g., working notes, Assessment Forms, etc.) will be reviewed for classification.

This site will provide the necessary safeguards and security administrative support to the assessment team members. This will include providing secure environments and equipment. Areas approved for classified work should be identified during the site orientation, the week of June 5-9, 1995. The goal is to provide classified work support so that classified documents, notes, and discussions can be declassified through revision and interpretation so as not to impede work of the assessment team. The scope of this administrative support includes:

- Secure work areas and areas outside security zones
- Access to unclassified and secure equipment (personal computers, laser printers, copiers, etc.)
- Unclassified and classified document storage
- Access to an authorized classifier
- Site classified documents
- Personnel access and badging
- Telephone (including access to secure telephones if needed)

The final report will also be reviewed for classification. To allow complete access to all technical security areas, all assessment team members must have current Q clearances.

7.5 Required Reading List

The following required reading list has been developed to assist the team members in preparation for the assessments. Additional references are noted in Appendix H, *References*.

- Criticality Safety Assessment Program for Defense Nuclear Facilities Safety Board, Deficiencies in Criticality Safety at Oak Ridge Y-12 Plant (latest revision)

- DNFSB Recommendation 94-4, *Deficiencies in Criticality Safety at Oak Ridge Y-12 Plant*
- DNFSB Recommendation 93-6, *Maintaining Access to Nuclear Weapons Experience*
- DNFSB Recommendation 92-5, *Maintaining Access to Nuclear Weapons Experience*
- ESS-CS-101, *Nuclear Criticality Safety Program Elements*, Revision 0 (or latest revision)
- Implementation Plan for Defense Nuclear Facilities Safety Board Recommendation 94-4, *Deficiencies in Criticality Safety at Oak Ridge Y-12 Plant*, February 1995
- Y/DD-500, *The Y-12 Plant Nuclear Criticality Safety Program Description*
- Y/AD-622, *Type C Investigation of the Y-12 Plant Criticality Safety Approval Infractions Event at Building 9204-2E*
- Y/DD-623, *Plan for Continuing and Resuming Operations*, October 1994

8.0 Deliverables

Team members will prepare a draft report after the conclusion of the assessment. The report will document the review of the performance objectives and identify any observations, open concerns, and noteworthy practices. The report may contain corrective actions completed or proposed, along with implementation schedules. The Assessment Forms will provide the basis for the final report and shall be completed and signed prior to departing from the site. Appendix I, *Final Report Outline*, provides the suggested format to be used for development of the final report.

Glossary

Concern - Any situation that is not in violation of any written procedure, but in the judgment of the assessment team member indicates less than optimal performance and could be an indicator of more serious problems.

Finding - A statement of fact documenting a deviation from an applicable Federal law, DOE Order, standard, safety requirement, performance standard, or approved procedure.

Noteworthy Practices - Practices that are notable and will have general application to other DOE facilities for the improvement of overall safety or performance.

Observation - Any situation that is not in violation of any written procedure or requirement, but in the judgment of the assessment team member is worthy of raising to the attention of site management in order to enhance overall performance.

Violation - For CSAs this would be considered a category IV classified incident of highest as defined in Y70-150, *Nuclear Criticality Safety*, (Change Directive May 18, 1993 or latest

revision); for OSRs, this would be the threshold criteria defined in DOE 5000.3B, *Occurrence Reporting and Processing*.

APPENDIX A
PROPOSED FACILITIES LIST

Y-12 BUILDINGS INVOLVED IN RESTART

The following is a preliminary listing provided by LMES of buildings involved in the Y-12 restart program. Any and all facilities at the Y-12 site under DP cognizance that have CSAs and OSRs are subject to this review.

RECEIPT SHIPMENT AND STORAGE OF URANIUM

9204-4
9720-5
9998
9204-2E

Y-12 DISASSEMBLY AND ASSEMBLY OPERATIONS

9204-2E
9204-2

Y-12 QUALITY EVALUATION OPERATIONS

9204-4

Y-12 ENRICHED URANIUM OPERATIONS

9720-32
9720-33
9723-25
9212
9995
9215
9206

Y-12 DEPLETED URANIUM OPERATIONS

9204-4
9201-SN
9201-5
9215
9996
9998

APPENDIX B

PEER REVIEW AND ASSESSMENT TEAM MEMBERS BIOGRAPHICAL SUMMARIES

TEAM LEADERS

MILTON HAAS - EH 34

Mr. Haas is a chemical engineer who began his career in 1960 as a leadman with the Coors Porcelain Company where enriched uranium-berylia fuel elements were fabricated for the Tory II-C reactor, a part of Project Pluto. In addition to his operations responsibilities, he was designated as a nuclear criticality safety inspector. He subsequently joined the Chemical Engineering Division at Argonne National Laboratory and performed bench scale development in support of the fluidized-bed fluoride volatility reprocessing of reactor fuels. This work was performed with plutonium, uranium, and "mock" fission products. In 1973 Mr. Haas transferred to the EBR-II Project at Argonne West where initially he was special Projects Engineer for the restart of the Argonne Fuel Fabrication Line. Later, he led the driver fuel assembly group. At Los Alamos he participated in the shutdown of plutonium operations at DP West and the startup of aqueous plutonium/americium recovery operations and R&D at TA-55. Mr. Haas ultimately became the group leader of MST-12 (Nuclear Materials Process Technology), responsible for all aqueous plutonium processing at TA-55 and the Enriched Uranium Recovery Operations remaining at DP West. Concurrent to this assignment, Mr. Haas served on the Los Alamos Nuclear Criticality Safety Committee. In 1985 he moved to the Rockwell Hanford Operations (later Westinghouse Hanford Co.) and served in various capacities. These included management of three analytical laboratories in the 200 Area. Then at the Plutonium Finishing Plant, he served as Engineering Manager and later as the Deputy Plant Manager. Mr. Haas also served on the Safety and Environmental Advisory Council to the President of Westinghouse Hanford Company. Prior to joining the Department of Energy, EH-34, Mr. Haas was detailed to the Office of Facility Transition and Management, EM-60 at DOE Headquarters during 1993-1994, dedicated principally to the EM interests at Rocky Flats, and he served in the core group of the Plutonium Vulnerability as Deputy Team Leader for the Sandia and Argonne West assessments. He later co-authored the Plutonium Vulnerability Management Plan.

JAMES L WINTER - DP 31

Mr. Winter received a B.S. in Electrical Engineering from the U.S. Naval Academy, has continuing graduate education in the electrical power field, and is a registered Professional Engineer in the electrical field. He has over 11 years of diversified experience in Navy and commercial nuclear power prior to joining the Department of Energy in 1991. As a staff engineer in the Office of Engineering and Operations Support for Defense Programs, primary responsibilities have included managing upgrades and developing policy for DP facilities safety documentation (Safety Analysis Reports (SAR), Basis for Interim Operations, and

Technical Safety Requirements (TSR)) and their implementation plans. Specific experience includes team leader responsibilities for the review and approval of the Replacement Tritium Facility FSAR, F-Canyon BIO and PHA, and FB-Line BIO and PHA. In addition, Mr. Winter contributed in the development of DOE Standards 3009 and 3011 associated with SAR and TSR content and implementation.

PEER REVIEW TEAM MEMBERS

J. BLAIR BRIGGS

Mr. Briggs is an Advisory Engineer at the Idaho National Engineering Laboratory (INEL). He has over 18 years experience in nuclear criticality safety. This experience includes over a year in operations at the Idaho Chemical Processing Plant with the remainder of his experience focused primarily on Nuclear Criticality Safety Analysis. Prior to he consolidation of contractors at INEL, Mr. Briggs was responsible for providing technical leadership in coordinating all criticality safety assessments provided by the EG&G Idaho Reactor and Radiation Physics Unit. This unit provided Criticality Safety support to all INEL contractors and to companies external to the INEL. During 1992/1993, he chaired a national working group that developed a DOE Standard entitled, *Guidelines for Preparing Criticality Safety Evaluations at Department of Energy Non-Reactor Nuclear Facilities - DOE-STD-3007-93.* He has participated on the EG&G HS&E Transition Team for the takeover of the Rocky Flats Plant, and various other review teams at Rocky Flats, Hanford, and Lawrence Livermore National Laboratory. Since 1992, Mr. Briggs has served as the project manager of the International Criticality Safety Benchmark Evaluation Project (ICSBEP) that is chartered to identify benchmark critical data, verify and evaluate the data, and compile the data into a standardized format that will serve as an accurate basis document for future validation efforts.

IVON E. FERGUS

Mr. Fergus is a physical scientist in the Office of Engineering Assistance and Site Interface, Office of Nuclear and Facility Safety. He has nearly 25 years experience in nuclear criticality safety. He has worked in this capacity for approximately five years, performing assessments and reviews of various Department of Energy facilities and policies involving criticality safety. Mr. Fergus' prior experience includes being a member of the Three Mile Island-2 Safety Review Group while working for Bechtel National, Inc. He has 12 years additional experience as a criticality safety engineer/analyst, performing criticality safety evaluations and audits at both DOE and commercial nuclear facilities. This experience included eight years as a Criticality Safety Engineer, Idaho Chemical Processing Plant; one-and-a-half years as a Criticality Safety Analyst for Babcock and Wilcox Company at the Lynchburg Research Center; and two-and-a-half years as a Criticality Safety Analyst for General Electric Company at the Wilmington Fuel Fabrication Facility. Mr. Fergus holds a B.A. in physics and mathematics from the University of North Carolina at Wilmington and he has completed all course work toward a Masters of Nuclear Engineering from the University of Idaho.

JAMES E. GRISE

Mr. Grise is a Senior Executive Consultant with SMS Corporation. He holds a BS in Engineering and an MS in Marine Affairs. Mr. Grise has 34 years of experience in the

engineering and nuclear fields. The first 29 years of his career were spent in the Navy, including 24 years in the Nuclear Propulsion Program. He spent six years as the Commanding Officer of two nuclear submarines. Post-submarine command tours included assignments in nuclear maintenance, operations, inspections, and training. As Commanding Officer of the Navy's largest afloat facility for nuclear plant repairs, he was responsible for the supply and repair of 13 submarines. In 1988, Mr. Grise retired from the Navy. Since that time, he has served as a consultant to the Department of Energy in the areas of training, inspection/appraisals, Operational Readiness Reviews, and as a Conduct of Operations monitor at various facilities. As a result of his Navy nuclear experience, he possesses expertise in most areas of nuclear operation and maintenance, particularly training, management, and inspection/oversight. Additionally, Mr. Grise has three years of experience at Savannah River Site, one and one-half years at Rocky Flats, and two years at Los Alamos National Laboratory. Mr. Grise has participated in Operational Readiness Reviews at K-Reactor, F-Canyon, and FB-Line at Savannah River Site, the Building 707 Corporate Operational Readiness Review at Rocky Flats and the Plutonium Facility Readiness Assessment at Los Alamos National Laboratory.

JOHN PEARSON

Dr. Pearson is a physicist and criticality safety specialist currently assigned as Deputy Division Leader of the Special Products Division of the Hazards Control Department at Lawrence Livermore National Laboratory. In this assignment, he also provides management oversight and technical leadership for the Criticality Safety Discipline at LLNL. Dr. Pearson has a B.S., M.A., and Ph.D. in physics from the University of California at Davis. He has fourteen years at the Critical Mass Laboratory at the Rocky Flats Plant designing, performing, and reporting critical assembly experiments for criticality safety use including three years managing the facility. In the ten years at LLNL he has performed criticality safety calculations and evaluations for nuclear facilities, nuclear weapons and nuclear components. He has sewed on the DOE Weapons Criticality Committee, the Executive Board of the Nuclear Criticality Safety Division of the American Nuclear Society (ANS), and an ANS consensus standards writing group. Dr. Pearson has also served as a criticality expert on numerous Transportation Safety Review Panels for the Department of Energy Albuquerque Office. He has authored or co-authored numerous journal articles and papers in the fields of nuclear physics, critical mass physics and nuclear criticality safety.

ASSESSMENT SUB-TEAM LEADERS

THOMAS A. REILLY

Mr. Reilly has 24 years of experience in the processes for the recovery of plutonium and uranium as implemented at the separation plants at the Savannah River Site. For the past 17 years Mr. Reilly has had both technical and managerial assignments concentrated on the nuclear criticality safety aspects of these operations. Mr. Reilly earned a Master of Chemical Engineering from the University of Delaware. Mr. Reilly is knowledgeable in the application of the DOE Orders and Standards and national consensus standards that e pertinent to nuclear criticality safety.

ALAN K. WILLIAMS

Mr. Williams has 43 years experience in design, development, operation, and management of chemical processes for the recovery of nuclear materials such as uranium, plutonium and americium. He is currently a consultant supporting DOE-HQ in conducting technical reviews. He has been a member of the ORR teams for B-559 startup and B-707 thermal stabilization at Rocky Flats, cold chemical runs for the Defense Waste Processing Facility and FB-Line at SRS, and restart of the Hanford 242-A Evaporator. He was a contributor to the DOE-DP study and criteria for interim storage of plutonium metal and oxide, a member of the working group for the ES&H Plutonium Vulnerability Study and Deputy Team Leader for the SRS assessment, is chairman of the EM-64 Surplus Materials Peer Panel, co-chair of the EM-60 Research Committee for response to DNFSB Recommendation 94-1, and member of the Technical Review Group for review of SARs for DWPF and West Valley Demonstration Project. Prior to joining SAIC, he was employed by Bechtel National as a project engineer and project manager on the SIS and PRMP projects, with Allied-General Nuclear Services where he was Vice President of Operations and Technical, and the Dow Chemical Co. at Rocky Flats Plant where he had increasingly responsible positions in process development, production support, and chemical operations for plutonium, americium and high enriched uranium.

ASSESSMENT TEAM MEMBERS

DENELLE E. FRIAR

Ms. Friar is a criticality safety specialist at Westinghouse Hanford Company (WHC). She has over 20 years experience in nuclear criticality safety. She has written criticality safety technical analyses and implementing documents for operations, conducted facility appraisals, and developed criticality safety programs and associated documentation. She has trained thousands of employees in criticality safety, including management, operations staff, crafts people, and administrative support personnel. She was acting manager of the WHC criticality engineering analysis group for over a year. Ms. Friar has been a member of the Executive Board of the Nuclear Criticality Safety Division of the American Nuclear Society, and a member of the writing group for ANS 8.20, the standard for criticality safety training. She has served on two assessment teams for DOE-HQ. Her current assignment is to assist the Rocky Flats site in developing a criticality safety program manual. Ms. Friar holds a BS in physics and a masters in business administration.

DAVID P. HEINRICHS

Mr. Heinrichs is a physicist, nuclear engineer, and criticality safety specialist in the Hazardous Control Department of the Lawrence Livermore National Laboratory (LLNL). Mr. Heinrichs performs nuclear criticality safety evaluations in support of fissile material operations at nine on-site nuclear facilities and three off-site operations at nuclear explosive facilities. His primary duties presently include the criticality safety of LLNL nuclear weapons, devices and components and liaison to the DOE Complex and DNA/military. Mr. Heinrichs is a member of the Weapons Criticality Committee, Nuclear Emergency Search Team and Accident Response Group. Mr. Heinrichs has over thirteen years of experience in the nuclear safety field with four and one-half years in his present position. Prior to joining LLNL, Mr. Heinrichs was a Senior Principal Criticality Safety Engineer at the Rocky Flats Plant and a Reactor Physicist for Middle South, Utilities/Systems Services and Yankee Atomic Electric Company. Mr. Heinrichs holds a B.S. in physics and applied mathematics and an M.S.E. in

nuclear engineering.

WILLIAM M. HOGLE

Mr. Hogle has over 20 years experience providing support in engineering, operations, maintenance, radioactive waste management, safety analysis, and management oversight for commercial nuclear power facilities and the Department of Energy. He is currently assigned as a principal consultant on various projects for the EH Office of Engineering Assistance and Site Interface and the EM Office of Safety and Health. Mr. Hogle has served on several assessment teams for DOE-HQ including HB Line, FB Line and F-Canyon at SRS, the Y-12 Plant at Oak Ridge, and the Portsmouth Gaseous Diffusion Plant. During these assessments, he was responsible for the areas of safety analysis, fire protection, maintenance and operations, configuration management, and engineering. He was a member of the ES&H Vulnerability Assessment Plutonium Working Group and the Savannah River Site Working Group Assessment Team. As part EM Worker Safety Improvement Program task team, Mr. Hogle worked with senior management et the Hanford, Idaho National Engineering Laboratory, Fernald, and Rocky Flats sites to improve workplace safety and health. He has authored several white papers for the Environmental Management Advisory Board on worker safety performance measures and has developed a worker safety indexing system for senior EM management. In addition, Mr. Hogle has participated in performance-based assessments for several commercial utilities and the Institute of Nuclear Power Operations. Prior to his work with DOE, Mr. Hogle was the Technical Support Systems Engineering Manager for Carolina Power & Lights Brunswick Nuclear facility. He holds a B.S. in Materials Science Engineering and a masters in business administration.

DOUGLAS A. OUTLAW

Mr. Outlaw is a PhD nuclear physicist with a broad safety-related background that includes university teaching, experimental nuclear physics research at a DOE accelerator laboratory and over 17 years of experience in safety analysis and assessment of non-reactor nuclear programs and activities for DOE NR and NASA. Most recently, his efforts have included assisting DOE headquarters in development of nuclear safety guidance, review of specific nuclear safety concerns at DOE facilities, and serving as a nuclear facility safety expert to DOE for Technical Safety Appraisals and Operational Readiness Reviews of DOE facilities. Other recent related activities have included criticality safety evaluations, probabilistic risk assessments, hazards evaluations, accident consequence modeling, and the preparation of accident analysis portions of safety analysis reports, environmental assessments, and environmental impact statements for DOE, NASA, and others. He is currently serving as a Senior Program Manager and Senior Scientist at SAIC. Dr. Outlaw served as a technical expert in the areas of safety analysis, criticality safety, engineering support, and other safety-related areas for facility reviews of DOE Defense Programs facilities. Between 1991 and 1993, Dr. Outlaw served as a technical expert in eight DOE-HQ/DP-67 sponsored Technical Safety Appraisals of DOE major facilities, including Mound Laboratories, Lawrence Livermore National Laboratories, the Pantex Plant, the Nevada Test Site, and the Kansas City Plant. Since 1993, Dr. Outlaw has served on Operational Readiness Reviews for Zone 4 at Pantex and F-Canyon at the Savannah River Site. Among the areas Dr. Outlaw in which had the lead were safety analysis, criticality safety, emergency preparedness, and engineering support.

LOUIS F. RESTREPO

Mr Restrepo has extensive experience and knowledge in implementing Code of Federal Regulations (10CFR), DOE Orders, Regulatory Guides, ANSI standards, and other industry standards in all areas of safety analysis, probabilistic risk assessment (PRA), and design of DOE nuclear facilities. He managed, contributed, and wrote close to two dozen safety analysis documents (SARs, SAs, OSRs, Tech. Specs, TSRs); prepared several other safety analysis documentation like USQs, ORRs; participated in DOE investigations and audits; and he has also developed guides on the implementation of DOE Orders including formal/content guides to write safety analysis documentation. He also has experience as a graduate and undergraduate instructor in engineering physics and PRA. He is currently in charge of implementing and developing methods in PRA and preparing safety analysis documentation for various Sandia facilities. He has served as a consultant to the nuclear power industry, DOE facilities, and DOE in all phases of safety analysis and PRA activities, including training. He was the lead engineer at Rocky Flats, where he supervised and coordinated the technical work of the Safety Analysis organization, also developed and implemented state-of-the-art methods and calculations in PRA; he was a co-author and author of all the safety analysis documentation (SARs, SAs) and Operational Safety Requirements (OSRs) for their nuclear facilities respectively; and developed the guidelines for the design of high-hazard nuclear facilities. Mr. Restrepo is also familiar with over two dozen computer codes and tools to support PRA and safety analysis activities, he has over 40 publications and papers in these areas. Mr. Restrepo has a BS in mathematics/physics from Montclair State, a MS in nuclear engineering from Cornell University, a MS in health physics from Georgia Institute of Technology and is currently completing his dissertation for a Ph.D. in nuclear engineering at the University of New Mexico.

MICHAEL R. SHARPSTEN

Dr. Sharpsten is a senior technical staff member in the safety analysis unit supporting Lockheed Martin Idaho Technologies operations associated with nuclear fuel dispositioning at the Idaho Chemical Processing Plant (ICPP) at the Idaho National Engineering Laboratory (INEL). He has received a B.A. in chemistry from the State University of New York at Pittsburgh, NY and a Ph.D. in chemistry from Montana State University at Bozeman, MT. Dr. Sharpsten started work at the ICPP in 1985 as a process chemist in the operations support section of the technical department. Primary responsibilities included flowsheet development and support for counter-current solvent extraction reprocessing operations utilizing successive purification cycles based upon tributylphosphate in n-dodecane and methylisobutyl ketone. Contributing work applied to head-end nuclear fuel dissolution flowsheets, uranium salvage processing, product denitration operations, and treatment/storage of high level wastes. Current work includes support to the generation of safety basis documents enveloping operations for nuclear fuel storage and high level waste treatment/storage. Major efforts being worked to transition the existing ICPP basis documents to currently required TSR DOE 5480.22 and SAR DOE 5480.23 formats. Dr. Sharpsten has participated in a number of safety assessment and vulnerability reviews and has been a member of the ICPP Radiation, Environment, Safety Committee since 1991. Contributing work has been provided to the Hanford Tank Waste Disposal Redefinition Peer Review (1991), the ICPP Tomsk-7 Lessons Learned Self Assessment Team (1993), and the ICPP dry product storage facility Operational Readiness Review (1995).

J. TODD TAYLOR

Mr. Taylor is the manager of the criticality safety group at the Idaho National Engineering Laboratory (INEL). Prior to his current position, Mr. Taylor was the Technical Group Leader for the criticality safety group at the Idaho Chemical Processing Plant (ICPP). Mr. Taylor has over 13 years of criticality safety experience, primarily with nuclear fuel processing and storage at the ICPP. Mr. Taylor was a member of the HS&E transition team for the Rocky Flats Plant and has been involved with evaluations/projects at Fernald and LLNL.

STUART G. VESSARD

Mr. Vessard is a criticality safety engineer at Los Alamos National Laboratory. His principal duties include the evaluation of criticality safety limits for LANL fissile materials operations and he is an instructor for the LANL nuclear criticality safety training course. Mr. Vessard received a BS in nuclear engineering from the University of Missouri at Rolls and an M.S.N.E. at the University of New Mexico. He began his career at General Electric in the fuel operations and testing unit. At the Los Alamos Plutonium Facility TA-55, he was responsible for plutonium waste management processes and was designated and served as the chairman of the Facility Safety Committee and the Criticality Safety Committee.

DOUGLAS K. VOGT

Mr. Vogt is a nuclear engineer with over 20 years experience in performing engineering analysis, safety analysis, and management oversight of commercial and government nuclear facilities. He has reviewed and analyzed activities at commercial nuclear fuel cycle facilities, nuclear power plants, and waste management facilities. He has experience with DOE research and production facilities. He has led or participated in safety analyses for numerous DOE facilities at Rocky Flats, LLNL and LANL. Mr. Vogt holds a Bachelor of Engineering Science and a Master of Science, Nuclear engineering, both from the Georgia Institute of Technology. Safety Analyses have included probabilistic risk assessments (PRA) for nuclear criticality accidents and the establishment of OSRs to prevent accidental nuclear criticality. He has assisted LLNL in developing and implementing an independent Conduct of Operations program.

SUPPORT

MICHAEL J. CROUSE

Mr. Crouse has three years of experience in nuclear criticality safety as it relates to the separation processes at the Savannah River Site. Recently, Mr. Crouse was involved in performing the criticality safety analysis in support of the SRS Solidification Facility Project (USF). The SRS USF is modeled on a similar facility as the Oak Ridge Y-12 plant. Mr. Crouse earned a Master of Nuclear Engineering degree from the University of Tennessee. Mr. Crouse has experience in the conduct of facility compliance assessments for site specific and DOE Order requirements.

DENNIS GALVIN

Mr. Galvin is a general engineer with the Office of Engineering and Operations Support for Defense Programs. He joined the Department of Energy as a technical intern in 1991. As an intern for two and one half years, he assisted on several engineering assessments, including assisting facility representatives at Rocky Flats for five months and assisting the resident inspectors at the Susquehanna Steam Electric Station for nine months. For the past one and one-half years, he has provided criticality safety support to Defense Programs. Mr. Galvin has a BS in nuclear engineering from Penn State University.

BARBARA K. KNEECE

Ms. Kneece has over 20 years of experience in administrative management and support to various elements of public and private enterprises. She currently is assigned as a project analyst for the Office of Engineering Assistance and Site Interface (EH-34). Ms. Kneece has performed as the administrative support coordinator for numerous assessments for EH including Rocky Flats Building 707, Building 559, and Supercompaction and Repackaging facilities; Savannah River Site HB-Line, FB-Line, and Replacement Tritium facilities; Princeton Plasma Physics Laboratory Tokamak Fusion Test Reactor; Portsmouth Gaseous Diffusion Plant; the DOE Complex Spent Fuel Initiative; and the Plutonium Vulnerability Assessment. As administrative coordinator and office manager for Argonne National Laboratory, she established a satellite office for the DOE New Production Reactor program in Aiken, S.C.

SAMUEL ROSENBLOOM

Mr. Rosenbloom earned the degrees of Bachelor of Science in Biophysics and Master of Science in Nuclear Engineering from the University of Maryland. He has extensive training in electrical instrumentation. Mr. Rosenbloom completed an internship for his degree in Biophysics at the University of Maryland Medical School Teaching Facility. He has managed instrumentation and sensor development programs. Mr. Rosenbloom served the Defense Nuclear Agency as the principal point-of-contact during extremely controversial environmental litigation against the U.S. Government concerning alleged adverse environmental impact of Department of Defense facilities in Virginia and New Mexico. Mr. Rosenbloom has an academic knowledge of contracts and contract law. He is the author of DOE 5480.24, *Nuclear Criticality Safety*, and he has extensive knowledge of DOE policy development.

APPENDIX C

TASK #2

PERFORMANCE OBJECTIVES, REVIEW CRITERIA, APPROACH AND EXPECTATIONS

PERFORMANCE OBJECTIVE CO-1: OSRs

Performance Objective CO-1.1:

LMES has evaluated the adequacy of and compliance with OSRs, has established corresponding corrective actions, and is actively addressing those corrective actions.

Review Criteria:

There is an audit path from OSR to verification of compliance. The OSR compliance evaluation performed by LMES should identify all nonconformances and corresponding corrective actors. The long-term corrective actions should be consistent with Recommendation 94-4.

DOE personnel should review and approve OSRs.

Applicable criteria specified in DOE 5480.22, Section 9, *Technical Safety Requirements* or DOE 5460.5, *Safety of Nuclear Facilities.*

Approach:

Review the results of the LMES evaluation corrective action plan and closure documentation (N.1.1, N.1.2, and N.1.3), focusing on the scope, methodology of review, completeness, and corrective actions associated with OSR compliance.

Review applicable criteria specified in DOE 5480.22, Section 9, *Technical Safety Requirements* or cancelled Order 5480.5, whichever requirements are currently in place.

Review applicable portions of the following documents as they relate to OSR compliance:

1. Completed Readiness Assessments as a broad scope application to Y-12;

2. Evaluation of corrective actions related to probable causes documented in the Type C Investigation (Y/AD-22);

3. Evaluation of corrective actions related to causal factors in the report, "Evaluation of Criticality Safety Discrepancy Data," (LMES internal correspondence of October 12, 1994);

4. An assessment of progress by LMES in Phase III and IV activities involving criticality safety as defined in "Plan for Continuing and Resuming Operations,a (Y/AD-23), or subsequent plans as revised; and

5. Lessons learned from resumption activities at the Pantex Plant and TA-55 facility at LANL will be developed and applied.

Evaluate whether resumption oriented commitments related to OSRs are being sustained and that longer term plans are consistent with Recommendation 94-4 and related LMES commitments already specified in the Task 2 portion of the Implementation Plan. Perform an assessment of DOE management, specifically focusing on YSO and OR responsibilities as they relate to OSR review and approvals.

Expectations:

Upon completing Performance Objective CO-1.1, team members should be able to determine with respect to OSRs, whether (1) resumption orientated commitments are being properly fulfilled and (2) the long term actions are consistent with Recommendation 94-4. Through the use of the suggested approach criteria, review of procedures and programs, and interviews, team members should develop an indication of the programmatic structures, the corrective actions resulting from near term actions, and the infrastructure that support long term improvements with respect to OSR compliance. Specifically, team members should be able to determine the long-term posture of Lockheed Martin Energy Systems, Inc., the Y-12 Site Office, and the Oak Ridge Operations Office related to the adequacy and execution of the upgraded OSR procedures. Team members should be able to ascertain whether the root causes identified and corresponding corrective actions identified by LMES are correct and relevant, and will effectively provide long-term programmatic improvements (refer to Performance Objective CO-3.0).

Performance Objective CO-1.2:

Facility operations governed by OSRs have a process to ensure all surveillance procedures and administrative controls are adhered to in order to confirm facility safety system operability.

Review Criteria:

Procedural controls are in place to ensure compliance with OSRs. OSR statements are clear and concise. Compliance methodology is clearly defined and OSR noncompliance are being reported immediately. Surveillance procedures confirm safety system operability.

Approach:

Perform a representative vertical and horizontal slice for the defense nuclear facilities at Y-12. Consider the OSRs for the resumed facilities, those active OSRs for non-resumed facilities, and in-process revisions to OSRs. In-place revisions and active OSRs at non-resumed facilities should be considered from a lessons learned perspective.

Interview operations, maintenance, and related support staff, including LMES management and DOE area personnel, in both a resumption and non-resumption area. Review all OSRs at each facility location and compare with the central OSR control location. Review the Facility System Status files for each OSR related system and ensure that each of the required surveillances has been completed within the frequency requirements. Review each facility OSR matrix to ensure that a representative sample of each OSR has been addressed by a facility procedure, and that the referenced component or system is listed.

Verify the existence of a representative sample of administrative procedures establishing the administrative control programs committed in the OSR (among these a management system to track and schedule OSR surveillance procedures). Also ensure that equipment inspections are performed as required by the OSR. Observe facility operations (e.g., storage conditions, material handling, etc.) to ensure specific OSRs are being met.

Expectations:

Upon completing Performance Objective CO-1.2, team members should be able to determine with respect to OSRs, whether the statements are clear and concise and that the appropriate configuration management controls are in place. Team members should be able to determine if facility operations governed by OSRs have a process that (1) ensures surveillance procedures are completed within the frequency requirements and (2) confirm facility safety system operability. In addition, team members should also be able to determine whether a culture exists that encourages OSR noncompliance to be immediately reported.

Performance Objective CO-1.3:

Surveillance procedures are in place that test and/or calibrate OSR required facility safety systems, facility safety instrumentation, and other instrumentation monitoring limiting conditions for operation.

Surveillance, inspection, and testing activities should provide assurance that the equipment needed for safe reliable facility operation performs within required limits and that preventive maintenance, defined as including periodic and planned maintenance, is utilized to maintain a piece of equipment within design operating conditions and to realize its maximum reasonable useful life. (DOE 4330.4B, Section 3.6.1)

Review Criteria:

Approved surveillance procedures to test and/or calibrate OSR required facility safety systems, facility safety instrumentation, and other instrumentation monitoring limiting conditions for operation or that satisfy the OSR are in place.

As part of the maintenance surveillance program, functional tests of installed equipment and/or systems (such as standby equipment or nonoperating equipment scheduled for rotation) are conducted and documented.

Abnormalities found during surveillances or preventive maintenance are immediately reported to higher authority.

Approach:

Verify the surveillance requirements of the OSR are implemented by procedures and each facility safety system, facility safety instrumentation, and other instrumentation monitoring limiting conditions for operation or that satisfy the OSR has one or more procedures to demonstrate operability.

Verify that one or more surveillance procedures have been prepared and approved to address the requirements of each of the OSRs. Review at least one of the surveillance procedures to ensure that it completely addresses the testing requirements in the OSR.

Through sampling, verify that the instrumentation utilized to support limiting conditions of operation and surveillance procedures acceptance criteria have been included in the

calibration program. Review a sample of performance validation records and verify that performance validations have been performed for the surveillance procedures.

Expectations:

Upon completing Performance Objectives CO-1.3 and CO-1.4, team members should be able to determine facility compliance with OSR surveillances. In addition, team members should be able to determine whether a system exits that encourages the reporting to a higher authority any abnormalities found during surveillances or preventive maintenance.

Performance Objective CO-1.4:

OSRs provide the safety envelope for the facilities being evaluated and support the respective safety basis.

Review Criteria:

OSRs are comprehensive and complete; and clearly define the safety envelope (or bounds) of operations in accordance with DOE 5480.5 or DOE 5480.22.

Approach:

Select representative OSRs for a facility operation and a set of OSR (i.e., LCOs for a selected group of facility operations) to verify that activities are performed within the approved OSRs. Interview safety analysts, criticality engineers, and related support staff including LMES management and DOE area personnel.

Expectations:

Upon completing Performance Objectives CO-1.3 and CO-1.4, team members should be able to determine facility compliance with OSR surveillances. In addition, team members should be able to determine that the facility OSRs are comprehensive and complete, and clearly define the safety envelope of operations in accordance with DOE 5480.5 or DOE 5480.22.

Performance Objective CO-1.5:

All OSRs and Class 1 and Class 2 procedures are consistent with each other.

Review Criteria:

OSRs and Class 1/Class 2 procedures are consistent and in agreement.

Approach:

Perform a vertical slice (facility specific) in a random sample of OSRs to determine consistency with associated Class 1 and Class 2 procedures. Check to ensure that configuration management controls are in effect for these procedures.

Expectations:

Upon completing Performance Objective CO-1.5, team members should be able to verify that the OSRs and Class 1 and 2 procedures properly compliment each other. They should be able to identify a process that ensures proper reviews are conducted in the event changes are made to either OSRs or procedures. In addition (along with Performance Objectives CO-1.2 and CO-1.6), team members should be able to determine whether the configuration management controls in place provide the proper measure of administrative control.

Performance Objective CO-1.6:

OSRs are controlled documents. Operations involving OSRs are controlled and activities are performed with the approved safety basis.

Review Criteria:

OSRs have been reviewed and approved by DOE in accordance with DOE 5480.22.

Approach:

Select all OSRs and review each for revision documentation (reviews, validation, approval forms, verification, etc.). Ensure that the appropriate configuration management controls are in place.

Expectations:

Upon completing Performance Objectives CO-1.2, CO-1.5, and CO-1.6, team members should be able to verify that the appropriate configuration control elements are in place (including reviews, validations, approvals, verifications, etc.). In addition, team members should be able to determine if the OSRs have been properly approved by DOE using the applicable DOE Orders.

Performance Objective CO-1.7:

Workers have a clear demonstrated understanding of the compliance requirements of OSRs. Personnel responsible for supervising and/or performing facility operations, surveillance testing, and maintenance understand the OSR and the facility safety systems controlled by the OSR.

Review Criteria:

Workers should be able to demonstrate a clear understanding of the compliance requirements of the new and revised OSRs in order to safety perform their respective duties. (DOE 5480.20A, Chapter 1.7.d and Chapter IV.4).

Approach:

Interview operations, maintenance, and related support staff, including DOE area personnel,

in both a resumed and non-resumed area concerning their understanding of compliance requirements. Interview an individual responsible for supervising and/or performing facility operations, surveillance testing, and maintenance to determine an understanding of the OSR and the facility safety systems controlled by the OSR. Determine how the importance of procedural compliance and understanding of safety requirements are addressed in training.

Expectations:

Upon completing Performance Objective CO-1.7, team members should be able to verify that workers have a clear understanding of the compliance requirements of the new and revised OSRs in order to safely perform their respective duties. Through the interview process, team members should be able to assess the effectiveness of any training concerning procedural compliance. In addition, team members should be able to determine whether a culture now exists that encourages compliance with OSRs and procedures.

Performance Objective CO-1.8:

All personnel have been trained on the new and revised OSRs.

Review Criteria:

All facility personnel have successfully completed training on the new and revised OSRs.

The programs shall be structured commensurate with specific position needs, and shall be administered on a cycle not to exceed two years. Continuing training shall include, at a minimum, training in significant facility system and component changes, applicable procedure changes, applicable industry operating experience, selected fundamentals with emphasis on seldom used knowledge and skills necessary to assure safety, and other training as needed to correct identified performance problems. (DOE 5480.20A, Section 7.d.(1)).

Continuing training programs for certified operations personnel shall consist of preplanned classroom-type training, on-the-job training, and operational evaluations on a regular and continuing basis. Continuing training programs for certified operators and certified supervisors shall included, at a minimum, the following as related to job performance: Technical Specifications/Operational Safety Requirements. (DOE 5480.20A, Section 7.d. (3).8)

Approach:

Review lesson plans and interview several operations, maintenance, and support organization staff to ensure training has been completed and personnel have the required level of knowledge. Check training records against directory of facility personnel to ensure all personnel have satisfactorily completed training. Observe the performance of an OSR surveillance procedure(s) to verify they are performed as written or if they cannot be performed as written, the operator knows what actions to take (e.g., stop work and inform supervision). Compare observations against the aforementioned requirements of DOE 5480.20A.

Review training records for personnel trained to perform surveillance procedures and trained to conduct maintenance on instrumentation used to verify OSR.

Expectations:

Upon completing Performance Objective CO-1.8, team members should be able to determine whether the training program provides emphasis on procedure compliance. Team members should be able to verify that workers receive continuing training in significant facility system and component changes, applicable procedure changes, applicable industry operating experience, selected fundamentals with emphasis on seldom used knowledge and skills necessary to assure safety, and other training as needed to correct identified performance problems. Team members should also be able to determine whether a culture exists that encourages workers to stop work and inform supervision when a procedural noncompliance exists.

PERFORMANCE OBJECTIVE CO-2: CSAs

Performance Objective CO-2.1:

LMES has evaluated the adequacy of and compliance with CSAs, has established corresponding corrective actions, and is actively addressing those corrective actions.

Review Criteria:

There is an audit path from CSA requirements to verification of compliance. The CSA compliance evaluation performed by LMES should identify all nonconformances and corresponding corrective actions. The long-term corrective actions should be consistent with Recommendation 94-4.

DOE personnel should conduct periodic reviews and surveillances of CSAs.

Applicable requirements specified in ANSI 8.19.

Approach:

Review the results of the LMES evaluation corrective action plan and closure documentation (N.1.1, N.1.2, N.1.3 and N.1.4), focusing on the scope, methodology of review, completeness, and corrective actions associated with CSA compliance.

Compare the requirements specified in ANSI 8.19 (particularly Sections 4, 5, 6, 7 and 9) against the requirements specified in the CSAs.

Review applicable portions of:

1. Completed Readiness Assessments as a broad scope application to Y-12;

2. Evaluation of corrective actions related to probable causes documented in the Type C Investigation (Y/AD-622);

3. Evaluation of corrective actions related to causal factors in the report, "Evaluation of Criticality Safety Discrepancy Data," (LMES internal correspondence of October 12, 1994);

4. An assessment of progress by LMES in Phase III and IV activities involving criticality safety as defined in "Plan for Continuing and Resuming Operations," (Y/AD-623), or subsequent plans as revised; and

5. Lessons learned from resumption activities at the Pantex Plant and TA-55 facility at LANL will be developed and applied.

Evaluate whether resumption oriented commitments related to CSAs are being sustained and that the longer term plans are consistent with Recommendation 94-4 and related LMES commitments already specified in the Task 2 portion of the Implementation Plan. Perform an assessment of DOE management, specifically focusing on YSO and OR responsibilities as they relate to CSA reviews and surveillances.

Expectations:

Upon completing Performance Objective CO-2.1, team members should be able to determine with respect to CSAs, whether (1) resumption orientated commitments are being properly fulfilled and (2) the long term actions are consistent with Recommendation 94-4. Through the use of the suggested approach criteria, review of procedures and programs, and interviews, team members should develop an indication of the programmatic structures, the corrective actions resulting from near term actions, and the infrastructure that support long term improvements with respect to CSA compliance. Specifically, team members should be able to determine the long-term posture of Lockheed Martin Energy Systems, Inc., the Y-12 Site Office, and the Oak Ridge Operations Office related to the adequacy and execution of the upgraded CSAs.

Performance Objective CO-2.2:

Safety related facility operations are governed by CSAs. The handling of CSA compliance and CSA noncompliance are governed by procedures.

Review Criteria:

Procedural controls are in place to ensure compliance with CSAs. CSA requirement statements are clear and concise. Compliance methodology is clearly defined and CSA noncompliance are being reported immediately.

Approach:

Perform a representative vertical and horizontal slice for the defense nuclear facilities at Y-12. Consider the CSAs for the resumed facilities, those active CSAs for non-resumed facilities, and in-process revisions to CSAs. In-place revisions and active CSAs at non-resumed facilities should be considered from a lessons learned perspective.

Interview a dedicated criticality safety engineer and operations counterpart in both a resumption and nonresumption area. Randomly select several CSAs and ensure that the requirements have been incorporated into the facility procedures. If significant problems are identified, expand the sample to confirm the initial findings. Where applicable, ensure that the limits specified in the CSAs and procedures are consistent. Also ensure that equipment inspections are performed as required by the CSA. Observe facility operations (e.g., storage conditions, material handling, etc.) to ensure specific CSA requirements are being met.

Expectations:

Upon completing Performance Objective CO-2.2, team members should be able to determine with respect to CSAs, whether the statements are clear and concise and that the appropriate procedural controls are in place. Team members should be able to determine if these controls are in place for both resumed and non-resumed facilities and that CSA requirements have been properly incorporated into facility procedures. In addition, team members should also be able to determine whether a culture exists that encourages the immediate reporting of CSA noncompliance.

Performance Objective CO-2.3:

All CSAs and Class 1 and Class 2 procedures are consistent with each other.

Review Criteria:

CSAs and Class 1 and Class 2 procedures are consistent and in agreement.

Approach:

Perform a vertical slice on a random sample of CSAs to determine consistency with associated Class 1 and Class 2 procedures with respect to implementing procedures of Near Term Initiative N.1.4. Check to ensure that configuration management controls are in place for these procedures.

Expectations:

Upon completing Performance Objective CO-2.3, team members should be able to determine whether the CSAs and Class 1 and 2 are consistent and procedures properly compliment each other. They should be able to identify a process that ensures proper reviews are conducted in the event changes are made to either the CSAs or Class 1 or 2 procedures. In addition, team members should be able to determine whether the configuration management controls in place provide the proper measure of administrative control.

Performance Objective CO-2.4:

CSAs are controlled documents. Operations involving CSAs are controlled and activities are performed within the approved safety basis.

Review Criteria:

CSAs required for operation have been reviewed, corrected, validated, and approved per established procedures.

DOE personnel perform periodic independent surveillances of CSAs.

Approach:

Randomly select several CSAs and review each for revision documentation (reviews, validation, approval forms, verification, etc.). Review the facility index to ensure that all CSAs are included, or a justification exists for exclusion. Ensure that the appropriate configuration management controls are in place and that activities are performed within the approved safety basis. Review the CSA program to ensure a process exits that provides for the review, approval and validation of CSAs. Review a sample of surveillances that are conducted by DOE personnel which provide an independent oversight of CSA adequacy and compliance.

Expectations:

Upon completing Performance Objective CO-2.4, team members should be able to determine whether CSAs are controlled and that the activities are properly performed within the approved safety basis. Along with CO-2.3, team members should be able to determine whether the appropriate configuration control elements (including reviews, validations, approvals, verifications, etc.) are in place. In addition, team members should be able to determine if the CSAs have been properly reviewed by DOE personnel.

Performance Objective CO-2.5:

Workers have a clear demonstrated understanding of the compliance requirements of CSAs. Personnel responsible for supervising and/or performing facility operations understand the CSA and the facility safety systems controlled by the CSAs. The utility of the CSAs has been evaluated for clarity and user friendliness.

Review Criteria:

Workers should be able to demonstrate a clear understanding of the compliance requirements of the new and revised CSAs. The CSAs should be clearly written, capable of being followed, and written such that the least experienced qualified operator can use them.

Approach:

Interview a dedicated criticality safety engineer, an operations counterpart; and a facility worker at both a resumed and non-resumed area concerning their understanding of compliance requirements. Interview an individual responsible for supervising and/or performing facility operations, surveillance testing, and maintenance to determine an understanding of the CSA and the facility safety systems affected by the CSA. Determine how the importance of procedural compliance and understanding of safety requirements are addressed in training. Determine if the CSAs are clearly written, capable of being followed, and written such that the least experienced operator can understand them and use them correctly.

Expectations:

Upon completing Performance Objective CO-2.5, team members should be able to verify that workers have a clear understanding of the compliance requirements of the new and revised CSAs. Through the interview process, team members should be able to assess the utility of CSAs and the effectiveness of any training concerning procedural compliance and understanding of safety requirements. In addition, team members should also be able to determine (1) the utility of CSAs and (2) whether a culture exists that encourages CSA and procedural compliance.

Performance Objective CO-2.6:

All personnel have been trained on the new and revised CSAs.

Review Criteria:

All facility personnel have successfully completed training on the new and revised CSAs.

The Programs shall be structured commensurate with specific position needs, and shall be administered on a cycle not to exceed two years. Continuing training shall include, at a minimum, training in significant facility system and component changes, applicable procedure changes, applicable industry operating experience, selected fundamentals with emphasis on seldom used knowledge and skills necessary to assure safety, and other training as needed to correct identified performance problems. (DOE 5480.20A, Section 7.d.(1))

Approach:

Review lesson plans and interview several operations staff and criticality safety engineer to ensure training has been completed and personnel have the required level of knowledge. Check training records against directory of facility personnel to ensure all personnel have satisfactorily completed training. Compare observations against the aforementioned requirement of DOE 5480.20A.

Expectations:

Upon completing Performance Objective CO-2.6, team members should be able to determine whether the training program provides emphasis on procedure compliance (specifically with regard to CSAs). Team members should be able to verify that workers receive continuing training in significant facility system and component changes, applicable procedure changes, applicable industry operating experience, selected fundamentals with emphasis on seldom used knowledge and skills necessary to assure safety, and other training as needed to correct identified performance problems. Team members should also be able to determine whether a culture exists that encourages workers to stop work and inform supervision when a procedural noncompliance occurs.

PERFORMANCE OBJECTIVE CO-3.0: ROOT CAUSE

LMES has identified the root cause of identified violations and established corresponding

corrective actions.

Review Criteria:

The root cause determinations have identified corrective actions that will preclude recurrence of the deficiencies.

Approach:

Review the results of the LMES evaluation, focusing on the scope, methodology of review, completeness, identification of root causes of violations, and corrective actions associated with OSR and CSA compliance.

Review the results of the LMES near-term initiatives completed for criticality safety focusing on the adequacy of the root causes analysis and corrective actions. In addition, review the completed actions associated with the following documents and determine if the root cause evaluations have identified the appropriate corrective actions to preclude recurrence of the deficiency:

- Corrective actions associated with Y/AD-622, *Type C Investigation*
- Corrective actions related to causal factors in the internal LMES report, *Evaluation of Criticality Safety Discrepancy Data*, dated October 12, 1994
- Progress by LMES in Phases III and IV activities involving criticality safety as defined in *Plan for Continuing and Resuming Operations*
- Applicable portions of completed Readiness Assessments

Independent of the analysis completed by LMES, determine the root cause of CSA, OSR and criticality safety violations identified since stand down of the facility. The reviewer should use the ORPS and LMES databases to identity these CSA and OSR violations. Compare the results of the analysis, including the corrective actions, against the LMES results.

Expectations:

Upon completing Performance Objective CO-3.0, team members should be able to verify that LMES has identified the root cause of identified violations and established appropriate corresponding corrective actions that will preclude recurrence of the deficiencies. Team members should be able to ascertain whether the root causes identified and corresponding corrective actions identified by LMES are correct and relevant and whether the corrective actions will effectively provide long-term programmatic improvements.

PERFORMANCE OBJECTIVE CO-4.0: LESSONS LEARNED

The applicability of experience gained from lessons learned at Rocky Flats Building 771, Sequoyah Fuels Corporation, Pantex and Los Alamos TA-55 has been incorporated into Y-12 practices and procedures:

Review Criteria:

Lessons learned from similar events at Rocky Flats Building 771, the Sequoyah Fuels Corporation, Pantex and Los Alamos TA-55 has been evaluated for applicability to Y-12 practices and procedures. A program exists at Y-12 that evaluates lessons learned from operating experience and determines applicability and actions required to minimize the potential for similar occurrences.

Approach:

Review the lessons learned at Rocky Flats Building 771, Sequoyah Fuels Corporation, Pantex and Los Alamos TA-55 and determine if they have been evaluated for applicability to Y-12 practices and procedures. Determine if a program exists for incorporating lessons learned from operating experience from both internal and external events.

Review lessons learned items from Y-12:

- Resumption Buildings - within past 2 years
- Nonresumption buildings - within last year of operation
- Look for repeat incidents and sharing of information across facilities

Interview a sample of personnel for lessons learned experience from amongst the following:

- Criticality safety
- DOE facility representative
- Operations management
- Operators
- Maintenance
- Others as applicable

Questions to include how new employees are made aware of lessons learned, willingness to report infractions, working knowledge of CSAs.

Conduct document reviews for lessons learned

- Training program
- Required reading
- List of infractions for past year, looking for trends
- Conduct of operations with respect to criticality safety lessons reamed
- How are infractions from one area transmitted to another area for lessons learned

Conduct walkdowns

- How much time do operators spend in other facilities
- Observe job specific performance based training

Based on the above activities, witness an evolution which demonstrates that one or more of the top infraction items have been addressed by the lessons learned program.

Expectations:

Upon completing Performance Objective CO-4.0, team members should be able to verify that LMES has identified the lessons learned from these off-site events and implemented the appropriate changes into site processes and procedures. Team members should be able to ascertain whether a continuing program exists for incorporating lessons learned from operating experience from both internal and external events.

APPENDIX D

TASK 3

PERFORMANCE OBJECTIVES, REVIEW CRITERIA, APPROACH AND EXPECTATIONS

PERFORMANCE OBJECTIVE CS-1

LMES organization responsible for criticality safety programs is in place and staffed, and there is an effective integration of the program elements.

Review Criteria:

The organizations responsible for implementation of the criticality safety program should be in place and staffed with experienced individuals (organizations include the criticality safety department, operations, emergency response, maintenance, etc.). Staffing levels should be determined and an aggressive recruitment program implemented for when a vacancy exists. The program elements are integrated for an effective program.

Applicable portions on ANSI/ANS 8.1, 8.19 and DOE 1324.2A and 5480.24.

Approach:

Review the program for the basic elements of criticality safety, and interview facility management personnel, criticality safety engineers, operations and maintenance personnel, and emergency preparedness personnel using the applicable requirements of ANSI/ANS 8.1 and 8.19 and DOE 1324.2A and 5480.24 as guidance.

Expectations:

Upon completion of Performance Objective CS-1, team members should be able to determine whether the criticality safety program meets the applicable requirements of ANSI/ANS 8.1 and 8.19 and DOE 1324.2A and 5480.24. In addition, team members should be able to determine the effectiveness of the integration of the various program elements.

PERFORMANCE OBJECTIVE CS-2

Management, operations, maintenance, and configuration control programs supporting storage of materials and criticality safety equipment together with the appropriate change control procedures are in place.

Review Criteria:

Applicable portions of ANSI/ANS 8.1, 8.3, 8.5, 8.7, and 8.19. Applicable conduct of operations requirements pertaining to criticality safety configuration control.

Approach:

Perform a vertical slice on both a resumed and non-resumed facility with active CSAs. Review the maintenance, operations, and configuration control procedures; interview management, operations and maintenance personnel; and walk down the portions of a resumption area using the applicable requirements of ANSI/ANS 8.1, 8.3, 8.5, 8.7, and 8.19 as guidance.

1. Verify that a program for maintaining the facility and equipment in accordance with DOE and ANS requirements is in place.

2. Observe at least two evolutions on criticality alarm systems such as the following:
    a. Power outage and backup power supply
    b. Alarm system test (quarterly)
    c. Monthly system test to radiation
    d. Test response performance of alarm system
    e. Maintenance of alarm system

3. Observe criticality evacuation drill (note this drill may take place prior to the assessment). Selected assessment team members will make a special trip to observe the drill.

4. Document review:

    a. Define if appropriate standards and DOE orders been referenced in applicable procedures.
    b. Review the preventative maintenance program for the criticality system.
    c. Perform a vertical slice of one resumed facility and one non-resumed facility with active CSAs regarding operating criticality alarm systems.

5. Interviews:
    a. Interview maintenance personnel on maintenance of detector equipment.
    b. Interview selected member(s) of criticality safety management committee on standards and overall performance of the criticality system (e.g., going from 2 decade to 5 decade detectors).

c. Interview operations personnel on the use of portable detectors.

Expectations:

Upon completion of Performance Objective CS-2, team members should be able to determine whether the management, operations, maintenance, and configuration control programs supporting storage of materials and criticality safety equipment together with the appropriate change control procedures meet the applicable portions of ANSI/ANS 8.1, 8.3, 8.5, 8.7, and 8.19, and conduct of operations requirements.

PERFORMANCE OBJECTIVE CS-3

A program for performing nuclear criticality safety evaluations has been developed and implemented.

- Nuclear criticality safety should be achieved by controlling one or more specified parameters of the system within subcritical limits. (ANSI/ANS 8.19, Sect. 8.2)

- Nuclear criticality safety evaluations of the design and operation of process equipment should ensure that subcriticality is maintained under normal and credible abnormal operating conditions. (ANSI/ANS B.19, Sect. 8.1)

Review Criteria:

Applicable portions of ANSI/ANS 8.1, 8.3, 8.7, 8.19, and DOE 5480.24.

Approach:

Review sample criticality safety evaluations and USQDs associated with criticality safety and perform a walkdown of a sample of facilities to determine the status of configuration management. The utility of criticality safety evaluations and approvals should be assessed. In addition, independent reviews, independent analysis methodology, sample basis and sample expansion, and technical content of CSEs should be sampled. Use the applicable requirements of ANSI/ANS 8.1, 8.3, 8.7, and 8.19 and DOE 5480.24 as guidance.

Expectations:

Upon completion of Performance Objective CS-3, team members should be able to verify whether a program for performing nuclear criticality safety evaluations has been developed and implemented that meets the applicable portions of ANSI/ANS 8.1, 8.3, 8.7, and 8.19 and DOE 5480.24. In addition, team members should be able to determine the utility of criticality safety evaluators and approvals.

PERFORMANCE OBJECTIVE CS-4

Administrative controls and implementing procedures are in place.

Review Criteria:

Criticality safety procedures required for areas scheduled for resumption have been reviewed, validated, approved.

Applicable portions of ANSI/ANS 8.1, 8.3 and 8.19 and DOE 1324.2A and 5481.1.

Approach:

Ensure that the appropriate procedural controls are in place. Review several criticality safety procedures that have been recently revised. Ensure that the latest revision is validated (via walkthrough), approved, distributed to all controlled locations, is considered a controlled document, that the latest revision is included in the Index of Procedures, and previous revisions have been replaced. Interview several plant personnel and determine whether they (1) have been recently trained on these procedures, (2) can identify the latest revisions, and (3) know where to find controlled copies. Ensure that the corrective actions identified to date have been included in the program and procedures. Review a sampling of criticality safety procedures and criticality safety audits, and walkdown several resumption areas using the applicable requirements of ANSI/ANS 8.1, 8.3, and 8.19 and DOE 1324.2A and 5484.1.

Expectations:

Upon completion of Performance Objective CS-4, team members should be able to determine the effectiveness of procedural controls associated with the criticality safety program. In addition, team members should be able to determine whether the criticality safety program and supporting procedures meet the applicable requirements of ANSI/ANS 8.1, 8.3, and 8.19 and DOE 1324.2A and 5484.1.

PERFORMANCE OBJECTIVE CS-5

Criticality safety training program has been developed and implemented.

Review Criteria:

The criticality safety training program meets the requirements of ANSI/ANS 8.20. Where the program does not meet a particular requirement, either an exception has been granted or a compensatory measure is in place.

Approach:

Interview a sampling of facility personnel assigned to resumption areas to determine if the criticality safety training program meets the requirements of ANSI/ANS 8.20. Identify any deviations from the standards.

Expectations:

Upon completion of Performance Objective CS-5, team members should be able to determine how the criticality safety training program meets the requirements of ANSI/ANS 8.20.

PERFORMANCE OBJECTIVE CS-6

LMES has completed an evaluation of the effectiveness of the Y-12 criticality safety program, established corresponding corrective actions where needed, and is actively addressing these corrective actions.

Review Criteria:

The LMES evaluation of the criticality safety program should identify all noncompliance and corresponding corrective actions. The long-term corrective actions should be consistent with Recommendation 94-4.

DOE management should conduct periodic reviews of the criticality safety program at Y-12.

Approach:

Review the results of the LMES evaluation corrective action plan and closure documentation (N.1.1, N.1.2, N.1.3. and N.1.4), focusing on the scope, methodology of review, completeness, root cause determination and corrective actions associated with the criticality safety program.

Review applicable portions of the following documents as they relate to the programmatic issues associated with the criticality safety program:

1. Completed Readiness Assessments as a broad scope application to Y-12;

2. Evaluation of corrective actions related to probable causes documented in the Type C investigation (Y/AD-622);

3. Evaluation of corrective actions related to causal factors in the report, "Evaluation of Criticality Safety Discrepancy Data," (LMES internal correspondence of October 12,1994);

4. An assessment of progress by LMES in Phase III and IV activities involving criticality safety as defined in "Plan for Continuing and Resuming Operations," (Y/AD-623), or subsequent plans as revised; and

5. Criteria developed as part of Commitment 3.1, and the results of the LMES evaluation completed as part of Commitment 3.2, and the corrective action plans developed as part of Commitment 3.3 of the Implementation Plan.

Evaluate whether resumption oriented commitments related to the criticality safety program are being sustained and that longer term plans are consistent with Recommendation 94-4 and related LMES commitments already specified in the Task 3 portion of the Implementation Plan. Perform an assessment of DOE management, specifically focusing on YSO and OR responsibilities as they relate to the criticality safety program.

Expectations:

Upon completing Performance Objective CS-6, team members should be able to determine

with respect to the criticality safety program at Y-12, whether (1) resumption orientated commitments are being properly fulfilled and (2) the long term actions are consistent with Recommendation 94-4. Through the use of the suggested approach criteria, review of procedures and programs, and interviews, team members should develop an indication of the programmatic structures, the corrective actions resulting from near term actors, and the infrastructure that support long term improvements with respect to the criticality safety program. Specifically, team members should be able to determine the long-term posture of Lockheed Martin Energy Systems, Inc., the Y-12 Site Office, and the Oak Ridge Operations Office related to the effectiveness and implementation of the long-term changes implemented to the criticality safety program at Y-12.

Also upon completing the performance objective, team members should be able to verify that LMES has identified the root cause of identified violations and established appropriate corresponding corrective actions that will preclude recurrence of previously identified deficiencies associated with the criticality safety program. Team members should be able to ascertain whether the root causes identified and corresponding corrective actions identified by LMES are correct and relevant and will effectively provide long-term programmatic improvements. Team members should be able to verify that a process is in place that properly identifies and corrects deficiencies such that a strong criticality safety program is established for the long-term.

APPENDIX E

ASSESSMENT FORMS

Assessment Form 1

Date:

Assessment Form 1 No.:
Review Area:
Responsible Individual:

I. Performance Objective:
(List the Performance Objective number and description from the Assessment Program)

II. Expectations:
(Provide the expectations for the Performance Objective as stated in the Assessment Program)

III. Review Criteria:
(Provide the criteria used for conducting the review)

IV. Approach:
(List the procedures and documents reviewed, names and titles of personnel interviewed, references used, and evolutions observed)

V. Discussion of Results with Basis:
(Document the results of the review in sufficient detail using both the review criteria and the expectations statement as guidance)

Assessment Form 1

Date:

Assessment Form 1 No.:
Review Area:
Responsible Individual:

VI. Conclusion:
(Concluding statement based on the discussion of results. The statement should conclude whether the criteria of the objective was met)

VII. Issues:
(List any issues identified as part of this review. All issues should also be documented on Assessment Form 2)

Originator: Date:

Approved: Date:

Assessment Form 2

Date:

Assessment Form 2 No.:
Review Area:
Responsible Individual:

Finding - A statement of fact documenting a deviation from an applicable Federal law, DOE Order, standard, safety requirement, performance standard, or approved procedure.
Concern - Any situation while not in violation of any written procedure, in the judgment of the assessment team member indicates less than optimal performance and could be the indicator of more serious problems.
Observation - Any situation while not in violation of any written procedure or requirements, in the judgment of the assessment team member is worthy of raising to the attention of site management in order to enhance overall performance.
Noteworthy Practices - Practices that are notable and will have general application to other DOE facilities for the improvement of overall safety or performance.

I. Identification Section
A.Statement
(Provide exact wording of the potential or final Finding, Concern, Observation or Noteworthy Practice):
B.Information Requested
(List any information needed to further evaluate this item):

II. Basis Section
For Findings, identify the related requirements (e.g., applicable DOE Orders, Standards or Review Criteria).
For Concerns, discuss how the situation results in less than optimal performance and is considered an indicator of more serious problems.
For Observations, identify the situation worthy of raising to the attention of site management

and discuss how it will enhance overall performance.
For Noteworthy Practices, identify those practices considered notable and that have general application to other DOE facilities for the improvement of overall safety of performances.
A.Description of Basis:
B.Documents reviewed, activities performed, persons contacted (include titles):

Assessment Form 2

Date:

Assessment Form 2 No.:
Review Area:
Responsible Individual:

III. Approval Section (Signatures)

Originator Date

Approved Date

Suggested Corrective Action:

IV. Contractor/DOE Response
(Provide results of Contractor/DOE review with technical basis and references.)

Accepted By: Date:

APPENDIX F
LESSONS LEARNED FROM ROCKY FLATS BUILDING 771, PANTEX, SEQUOYAH FUELS CORPORATION, and LOS ALAMOS TA-55

The observations and lessons learned presented in this Appendix are from similar Conduct of Operations (CoD) and criticality safety events and resumption efforts at Rocky Flats Building 771, the Pantex Site, and Los Alamos TA-55. Summaries of the events and lessons learned are presented such that team members may determine applicability of the lessons learned at these facilities to the resumption activities at the Y-12 Plant. Team members should read the full assessment reports in order to gain a better understanding of the applicability of these lessons learned to the Y-12 Site.

ROCKY FLATS BUILDING 771 EVENT

On September 29, 2994, an incident occurred at the Rocky Flats Environmental Technology Site (RFETS) in Building 771. Operations personnel drained Tank 467 that contained 210 liters of solution with a plutonium concentration of 0.5 g/L into 54 four-liter bottles inside a glovebox. The process vacuum was left on for one hour to ensure complete removal of any remaining moisture in the tank and process lines. All personnel left the area except for one process specialist. Without authority or direction, the process specialist drained 5 liters of solution from the process line from Tank D973. The liquid was darker in color than the other

solution drained from D467, which usually indicates a higher plutonium concentration. While the line was being drained, the foreman and production manager returned, witnessed the event, but did not stop the unauthorized activity. The three individuals diluted the solution among five four-liter bottles and falsified the entries on the glovebox nuclear materials balance card. Several days later, the production manager had the unauthorized sample analyzed. The results indicated a concentration that violated the Nuclear Material Safety Limits for the glovebox. Upon notification of the event, the shift manager terminated nuclear operations in the building.

Examples of lessons learned from this event include the following:

- The incident primarily reflected the inability of the contractor management to establish an appropriate safety culture. This permitted risky behavior by operating personnel. Management was ineffective in putting corrective actions in place to prevent recurrence of events.

- There was a shortage of experienced Nuclear Criticality Safety Engineers. In addition, the training program was determined to be inferior and the Nuclear Criticality Safety Committee was ineffective.

- Rocky Flats was unable to maintain an effective authorization basis, thereby increasing the potential for an accidental criticality.

- There was a severe communications breakdown between management and workers.

- There was a large backlog of criticality safety evaluations requiring peer review and CSAs requiring review. Reviews were being conducted by CSEs with only a marginal knowledge of the operations.

- Operating personnel considered that their extensive process knowledge kept them safe despite such unknowns as tank stratification, valve leakage, etc.

PANTEX CONDUCT OF OPERATIONS ASSESSMENTS AND LESSONS LEARNED

Assessments were conducted during January 1994 to evaluate the Conduct of Operations practices at the Pantex Plant. One assessments was done to determine what additional actions should be taken within DOE to aid in the implementation of the Conduct of Operations at the Pantex site. A separate team assessed the contractor's actions. An action plan was developed by the contractor to address the weaknesses identified and the recommendations of the assessment teams.

The DOE Assessment Team identified the following weaknesses:

- Facility Representatives were weak in the fundamental concepts and practical implementation of SARs, OSR requirements, and Basis for Interim Operation for facilities for which they were responsible

- Facility Representatives spent a significant portion of the field time assessing facility

material conditions while assessments of ongoing activities were less evident. While the overall understanding of facility operations was judged to be adequate, the understanding of the operational details was not as evident.

- Facility Representatives did not demonstrate ownership of the occurrence reporting system. Despite a belief that the contractor was under-reporting, they did not challenge classifications on a daily basis or elevate unresolved items to DOE management.

Other issues included:

- The Facility Representatives have little experience in operations that are performed in a disciplined and formal manner.
- The qualification program for Facility Representatives was halted by MO when management identified program problems. However, there were no corrective actions established.
- Training qualifications standards did not exist to define the program expectations nor provide a method for consistency and objectivity in evaluations.
- Inadequate resources are being utilized to develop and implement an oversight program.
- There was no written guidance for a daily routine for Facility Representatives and there was no written guidance for a systematic assessment program. No formal method for tracking closure of issues raised by Facility Representatives was noted.
- There was a lack of oversight of operations from DOE groups other than Facility Representatives.

The following are examples of the observations of the contractor assessment team:

- Most senior level, middle level, and lower levels of management had a shallow understanding of Conduct of Operations requirements and did not adequately understand the comprehensiveness involved in successfully implementing the Order.
- The concept of, and requirements for Facility Management needed to be formulated and promulgated.
- The Lockout/Tagout system had many deficiencies and needed strengthening.
- The RADCON program needed improvement.

SEQUOYAH FUELS CORPORATION

On January 4, 1986, one worker was killed and several injured when an overfilled cylinder of UF6 ruptured during heating at the Sequoyah Fuels Corporation in Gore, Oklahoma. The accident occurred despite the fact that heating of overfilled cylinders was recognized as dangerous and company procedures prohibited the practice.

Review of the failure of Sequoyah Fuels Corporation also offered several significant lessons learned. Those of particular applicability to the Y-12 NCS program improvement activities include those centered on building a safety culture in which management and the workforce fully understand their regulatory environment. In particular, these include:

- A workforce culture that does not understand the need to conform to committed programs and procedures will erode regulator confidence and create a negative environment.

- Management and the workforce must believe in a safety culture that rewards compliance with established procedures. There must also be negative consequences for not supporting the safety culture.

- The safety culture must be based on absolute-integrity and candidness by all employees. There must be an absolute mandate to be self-policing, to identify issues and problems, and to report violations and other information needed by regulators.

LOS ALAMOS DNFSB FINDINGS AND LESSONS LEARNED

On April 15,1994, LANL management at TA-55 terminated normal operations within PF4. Their actions followed two events caused by weaknesses in the implementation of OSR surveillance requirements. One involved the inoperability of the facility's diesel-driven fire pumps. Another event involved failure of an OSR surveillance regarding safe shutdown of the facility. These events emphasized deficiencies in the inadequacy of surveillance procedures, the failure of the technicians to perform surveillances, and the lack of notification of the facility management of the failure to meet surveillance acceptance criteria. LANL decided to continue the shutdown until tests intended to verify the surveillance requirements were assessed for their quality. The following items were identified as part of a DNFSB review of TA-55.

- The performance of a surveillance in support of OSRs revealed deficiencies in the verification that operations are conducted within the safety envelope.

- Several operating parameters found to be out-of-specification were not reported as such.

- The applicable procedures were not used. A checklist provided with a procedure was not filled out as required.

- The procedures were not written such that verbatim compliance was possible.

- Review of LANL TA-55 Order Compliance Self-Assessment revealed inadequacies in documentation of objective evidence of compliance.

  Requirements of DOE training Order 5480.20 were assessed as compliance based on the existence of a procedure with which the facility has not yet complied. This action delays consideration of corrective or compensatory measures for known noncompliance.

Compliance with some of the industry nuclear criticality standards required by DOE Order on criticality safety (5480.24) was based on previous assessments that actually indicated areas of noncompliance.

- Observation of a Cassini Line operation revealed deficiencies in the facility conduct of operations

  The work instruction used to change parts of the procedure appears to circumvent the normal review and approval process for procedure changes

  Critical steps requiring independent verification by a Quality Assurance Representative were signed off by the technician performing the step

- Review of the status and plans of the TA-55 training and qualification program revealed the need for several improvements, including the addition of fundamentals and systems training, in order to become compliant with DOE 5480.20. Many of the improvements have already been planned by LANL and will correct deficiencies noted in the Board staff trip report forwarded to DOE in January 1994.

Additional lessons learned from similar events at other facilities can be obtained from a review of the Occurrence Reporting and Processing System (ORPS).

APPENDIX G

DNFSB RECOMMENDATIONS 94-4, 93-6 and 92-5

RECOMMENDATION 94-4 TO THE SECRETARY OF ENERGY pursuant to 42 U.S.C. § 2286a(5) Atomic Energy Act of 1954, as amended.

Dated: September 27, 1994

The Defense Nuclear Facilities Safety Board (Board) has issued a number of recommendations concerning formality of operations, including Recommendation 92-5, Discipline of Operations in a Changing Defense Nuclear Facilities Complex. In that recommendation, the Board stated that facilities scheduled for continued operations should develop a style and level of conduct of operations which is comparable to that achieved at commercial nuclear facilities. Recommendation 92-5 further noted that, prior to achieving an acceptable level of formality, major improvements were required in a number of areas, including safety analysis reports, limiting conditions of operation, and braining and qualification of personnel.

The Board and its staff have been monitoring the Department of Energy's (DOE) efforts to implement an acceptable level of conduct of operations at the Y-12 Plant in Oak Ridge, Tennessee, which is scheduled for continued operations. The Board has forwarded a number of reports to DOE during the last two years indicating the existence of safety-related concerns regarding operations at Y-12. DOE and its operating contractor, Martin-Marietta Energy

Systems (MMES), have taken some actions to correct deficiencies; however, a number of recent events have led the Board to the conclusion that more aggressive and comprehensive management actions are required to bring the level of conduct of operations at Y-12 to a satisfactory level.

The Board notes that during the past four months a number of violations of Operational Safety Requirements and other safety limits have occurred at the Y-12 Plant. Most recently, the Board's staff identified a substantial violation of nuclear criticality safety limits within a special nuclear material storage vault at Y-12. When the staff identified this deficiency to on-site personnel, including a senior MMES manager, an MMES nuclear criticality safety specialist, and one of DOE's facility representatives, immediate corrective actions that were required by Y-12 procedures were not taken. In fact, proper corrective actions were not taken until the Board's staff informed the DOE Y-12 Site Manager. Subsequently MMES curtailed a number of operations at the Y-12 Plant. Reviews of compliance with nuclear criticality safety limits at the Y-12 Plant revealed that a widespread level of non-compliance exists.

In its Annual Report to Congress (February 1994) the Board noted that personnel and procedures are complementary elements in implementing conduct of operations. The report stated, "The health and safety of the public and workers rest on a properly trained workforce accomplishing tasks in a formal, deliberate fashion in accordance with reviewed and approved procedures. In responding to the Board's Recommendation 93-6, Maintaining Access to Nuclear Weapons Experience, DOE is evaluating the impact of expertise presently being lost through ongoing staff reductions on their ability to perform nuclear weapons dismantlement at Y-12.

The Board recognizes that DOE and MMES management have begun taking aggressive actions to correct the specific problems of adherence to nuclear criticality safety limits, since the nuclear criticality safety occurrence referred to above. However, the Board believes that more remains to be done. Accordingly, the Board recommends that

1. DOE determine the immediate actions necessary to resolve the nuclear criticality safety deficiencies at the Y-12 Plant, including actions deemed necessary before restarting curtailed operations and any compensatory measures instituted. These actions should be documented, along with an explanation of how the deficiencies remained undetected by MMES and DOE (line and oversight).

2. DOE perform the following for defense nuclear facilities at the Y-12 Plant:

    a. An evaluation of compliance with Operational Safety Requirements and Criticality Safety Approvals (CSAs), including a determination of the root cause of any identified violations. In performing this assessment, DOE should use the experience gained during similar reviews at the Los Alamos plutonium facility and during the recent "maintenance mode" at the Pantex Plant.

    b. A comprehensive review of the nuclear criticality safety program at the Y-12 Plant, including: the adequacy of procedural controls, the utility of the nuclear criticality safety approvals, and a root cause analysis of the extensive level of non-compliance found in recent reviews

c. A comparison of the current level of conduct of operations to the level expected by DOE in implementing the Board's Recommendation 92-5.

d. Development of plans, including schedules, to address any deficiencies identified in the analyses conducted above.

3. DOE evaluate the experience, training, and performance of key DOE and contractor personnel involved in safety-related activities at defense nuclear facilities within the Y-12 Plant to determine if those personnel have the skills and knowledge required to execute their nuclear safety responsibilities (in this regard, reference should be made to the critical safety elements developed as part of DOE's response to the Board's Recommendation 93-1).

4. DOE take whatever actions are necessary to correct any deficiencies identified in (3) above in the experience, training, and performance of DOE and contractor personnel.

/s/

John T. Conway, Chairman

RECOMMENDATION 93-6 TO THE SECRETARY OF ENERGY
pursuant to 42 U.S.C. § 2286a(5) Atomic Energy Act of 1954, as amended.

Dated: December 10, 1993

The ongoing reduction in size of the stockpile of nuclear weapons and the related changes in the defense nuclear complex have a number of safety-related consequences. The Board has addressed several of its sets of recommendations to such problem areas, including 92-5, which concerned discipline of operations in a changing defense nuclear facilities complex, and 93-2, which stated a continued need for capability to conduct critical experiments. We wish now to draw attention to the need to retain access to capability and capture the unique knowledge of individuals who have been engaged for many years in certain critical defense nuclear activities, in order to avoid future safety problems in these and related activities.

The first critical area requiring continued access to departing personnel is the disassembly of nuclear weapons at the Pantex site, an activity that will continue for a number of years. The second is the testing of nuclear explosives at the Nevada Test Site, an activity presently subject to a moratorium. However, the President, in establishing that moratorium, said that he has retained the possibility of later resumption of tests if that is needed, and that he expects the Department of Energy to maintain a capability to resume testing. In reaction to the recent Chinese underground test he has instructed the Department of Energy to take steps necessary to prepare for resumption, pending a decision as to whether further tests at the Nevada Test Site should be conducted.

A substantial amount of documentation exists on the design and safety aspects of nuclear weapons that will have to be dismantled at Pantex. This information is essential for the dismantlement program and is used in that program. Even so, the Board has pointed out that it is also important, for safety reasons, to involve individuals from the design laboratories of Los Alamos, Livermore, and Sandia in review of detailed dismantlement procedures and specialized procedures responding to problems encountered in the course of dismantlement. This practice has been initiated, and it has already been seen to be vital to safety assurance in the dismantlement program.

The design individuals from the laboratories most needed in connection with dismantlement of a specific weapon are those who had been active in the original design of that weapon. They are believed to possess information not recorded in documentation, such as reasons for specific design features, and personal knowledge of any problems that have arisen during design, fabrication, and stockpile life. Many of the remaining individuals with this background are being lost from the system, because of the University of California's recent retirement incentive, planned layoffs by contractors, and DOE downsizing and retirements. Some recent moves to prevent or discourage use of retired individuals as consultants compound the problem; they erect barriers that could prevent access to the needed expertise. Similar problems also arise in connection with maintaining capability for testing of nuclear explosives at the Nevada Test Site. On the assumption that the testing moratorium will continue, we foresee an impairment of capability to ensure the safety of tests if national priorities call for resumption of testing at some future time. This impairment will occur both through reduction in competence that naturally follows when a highly skilled operation is not conducted over a long period of time, and through loss of skilled and experienced personnel. The loss of skilled personnel will be especially troubling because there has traditionally been a high degree of dependence on administrative controls for safety in testing of nuclear explosive devices at the Nevada Test Site. Proper exercise of these administrative controls requires considerable background in past methods of test emplacement and test conduct, and extensive institutional memory.

The Board recognizes the Department's efforts to develop a "stockpile stewardship" program focused to ensure the continued safety and reliability of fielded weapons, to ensure maintenance of laboratory development capability, and to ensure a limited production capability. Our areas of concern complement these necessary activities, but are focused instead on ensuring that capability is maintained to conduct testing operations safely if they must be done, and that all future dismantlement activities can be completed safely. Although it may be relatively straightforward to maintain these capabilities in the near term, ensuring their availability 5 to 20 years in the future may be very difficult.

In accordance with the above concerns, the Board makes the following recommendations:

1. That a formal process be started to identify the skills and knowledge needed to develop or verify safe dismantlement or modification procedures specific to all remaining types of U.S. nuclear weapons (retired, inactive, reserve, and enduring stockpile systems). Included among the skills and knowledge should be the ability to conduct relevant safety analyses.

2. That a similar formal process be started to identify the skills and knowledge needed to safely conduct nuclear testing operations at the Nevada Test Site, including the

processes of assembly/disassembly, on-site transportation, insertion/emplacement, arming and firing, timing and control, and post-shot operations. Included among the skills and knowledge should be the ability to conduct relevant safety analyses.

3. That a practice be instituted of reviewing the personnel losses at the nuclear weapons laboratories and the Nevada Test Site, as well as the losses of key personnel from DOE's own staff engaged in nuclear defense activities, to ascertain which of the skills and knowledge are projected to be lost through departure of personnel.

4. That DOE and its defense nuclear contractors negotiate the continued availability (through retention, hiring, consulting, etc.) of those personnel scheduled to depart whose skills and knowledge have been determined to be important in accordance with the above.

5. That programs be initiated to obtain from these expert personnel (and to record) the as yet undocumented anecdotal technical information that would be of value in augmenting the technical knowledge and expertise of successor personnel. This should be done either prior to departure of the retiring personnel or shortly thereafter.

6. That procedures for safe disassembly of weapons systems be developed while the personnel with system-specific expertise on the original development of the weapons are still available. Likewise, analyses of the possibility of hazard from degradation of remaining nuclear weapons with time should be expedited, while these individuals are available. In addition, the current participation of design laboratory experts in the safety aspects of disassembly of weapons at the Pantex Site should be strengthened.

7. That a program be developed and instituted for maintaining expertise in operations key to safety of nuclear testing at the Nevada Test Site, to ensure that if testing is resumed at any future time, it can be performed with requisite safety. Possible components are those activities and experiments that would be permitted within limitations of treaties being discussed, for example: hydro-nuclear tests, backdrilling for isotopic analysis of residues from old shots, and exercises including steps in preparation for tests, up to actual emplacement.

8. Given the loss of experienced personnel, that a determination be made as to whether traditional dependence on administrative controls to ensure nuclear explosive safety at the Nevada Test Site would be adequate and appropriate if nuclear testing should be resumed at a later time. It may be found necessary to develop an approach for ensuring nuclear explosive safety in the testing program that is less dependent on the performance of highly experienced personnel, such as through the use of engineered safeguards similar to those used in fielded weapons as part of the arming and firing, and timing and control systems.

/s/

John T. Conway, Chairman

RECOMMENDATION 92-5 TO THE SECRETARY OF ENERGY
pursuant to 42 U.S.C. § 2286a(5) Atomic Energy Act of 1954, as amended.

Dated: August 17, 1992

The changes in defense-related plans in the Department of Energy are beginning to have a profound effect or the activities directed to systematic upgrading of the conduct of operations at defense nuclear facilities, plans that have often been discussed between the Board and its staff, on the one hand, and members of your staff on the other.

The Rocky Flats Plant presents an excellent example of the major changes being made by DOE while reconfiguring the nuclear weapons complex. It had been planned that as the Rocky Flats Plant moved toward resumption of production of plutonium components of nuclear weapons, a succession of facilities would be readied for renewed operation, beginning with Building 559 (the analytical chemistry laboratory), and followed by Building 707 and then others. This process was to include systematic upgrading of the quality of operations in each case, including Operational Readiness Reviews by the contractor and by DOE to verify that the desired improvements had been accomplished by line management. Resumption of operations is now proceeding in Building 559, in accordance with this process and following the path proposed in your Implementation Plan for the Board's Recommendations 90-4 and 91-4.

You have announced, however, that in light of international developments, plutonium production operations will not be resumed at the Rocky Flats Plant, and future activities there will be confined to cleanup and decontamination of the site, decommissioning of some facilities and parts of others, and placing of some facilities and parts of others in a state of readiness for resumption of operations in the future in the event such a step should be needed. Thus for most facilities at Rocky Flats there know a major change from the mission and activities, previously planned and for which the Board's Recommendations and your implementation plans specific to the Rocky Flats Plant were to be applied, for those recommendations were predicated upon resumption of plutonium production.

At a number of other defense nuclear facilities, similar changes are taking effect. Many facilities are now scheduled for cleanout, shutdown, and decommissioning. Some are to be devoted to aspects of cleanup and decommissioning of sites and of facilities located within sites. Some are slated to be placed in a standby mode, available for restart at a later date if needed. Some are to be continued in operation either in reduction of the stockpile of nuclear weapons or in the maintenance of a reduced stockpile and improvement of its safety.

Some of these facilities have been inactive for long periods of time. Some are to become involved in operations that differ from past usage. Experience shows that when operations are resumed at a facility that has been idle for an extended period, or a facility is operated in a new mode, there is an above-average possibility of mistakes, equipment failures, and violations of safety requirements, that could cause accidents. We believe that special attention is needed at such times. The appropriate measures to be followed depend on specific features of the facility, the nature of the planned campaign of use, and the long-term plan for the facility. For example, one needs to know if further campaigns are likely, of the same or different kinds; if the facility is to be decommissioned after the planned use; or if it is to be

placed in a standby mode.

The Board has found, through experience at the Savannah River Sites and the Rocky Flats Plant and other defense nuclear facilities, that an extended period of time has been required at major facilities to develop an acceptable style and level of conduct of operations. Accomplishing the cultural changes you have required and meeting safety standards comparable to those required of the civilian nuclear industry remains an ongoing challenge. Major improvements have been necessary including development of configuration control, revised and acceptable safety analysis, revised Limiting Conditions of Operation derivative from the safety analysis, operating procedures consistent with the configuration and the safety analysis, and training and qualification of operators for the new mode of operation. Continued improvement has been sought by the Board.

The Board has been informed that DOE does not intend to devote equivalent time and resources to improving the quality of operation at a facility being restarted only for a short campaign or intended for use only or a short campaign in a different mode, but would on a cost-benefit basis use a graded approach, always being sure, however, to take whatever compensatory and other measures are needed to ensure the acceptable level of safety.

The definition and exposition of a graded approach as it is meant to be used in ordering the conduct of operations have not been provided. In discharging its responsibilities in the context of the new defense-related plans of the Department of Energy, the Board intends to carefully review future operations at defense nuclear facilities on a case-by-case basis, starting in each instance from the best information as to the intended future use of the facility. Any proposals to use special measures or controls to compensate for deviations from those ordinarily used to achieve high quality conduct of operations will be closely scrutinized.

Therefore, it is requested that as you decide the future status of individual defense nuclear facilities you inform the Board, designating which ones are to continue in operation and their mission, which are to be shut down for decommissioning within a short time period, which are to be used for an extended time period and then shut down for decommissioning, and which are to be moved to a standby mode (along with the schedule for this).

Regardless of the category, the Board believes that operation and maintenance of defense nuclear facilities in all modes should be in accordance with the Nuclear Safety Policy statement that you issued on September 9, 1991 as SEN-35-91, and the safety goals stated therein.

The Board also believes that, to the extent practicable, facilities that are to be shut down and decommissioned should be cleaned up, and hazards from radiological exposures sufficiently reduced that access can be made freely without need for precautions against radioactivity, and facilities meant for standby status should be placed in such a condition that sudden need to reactivate them would not subject a new operating group to unacceptable radiation hazards.

In furtherance of this view it is recommended that:

1. For defense nuclear facilities scheduled for long term continued programmatic defense operations or for other long term uses such as in cleanup of radioactive contamination

or in storage of nuclear waste or other nuclear material from programmatic defense operations, the Department of Energy should institute a style and level of conduct of operations comparable to that toward which DOE has been working at Building 559 at the Rocky Flats Plant and the K-Reactor at the Savannah River Site, and which is at least comparable to that required for commercial nuclear facilities, addressing at a minimum the areas referred to above in connection with style of conduct of operations.

2. Where a facility, after a long period of idleness for whatever reason, is being readied for new use or reuse, special care should be taken to ensure that the line organization, both DOE and contractor, has the technical and managerial capability needed to carry out its responsibilities. Appropriate and effective Operational Readiness Reviews should be conducted by the contractor and by DOE before restart of the facility, to establish confidence that line management has provided satisfaction of safety requirements. Where national security requirements lead to urgent need to restart such facilities before necessary upgrades can be fully completed, compensatory measures should be instituted and their adequacy in ensuring the desired level of safety should be confirmed through appropriate independent review.

3. For facilities designated for the various other future modes of use (such as standby), DOE should undertake to develop specific criteria and requirements that ensure meeting the safety goals enunciated in your Nuclear Policy Statement (SEN-35-91). Accomplishment of these criteria and requirements by line management should be confirmed by appropriate independent review.

/s/

John T. Conway, Chairman

APPENDIX H - REFERENCES

The following required reading list has been developed to assist the assessment team members in preparation for the assessments.

- ANSI/ANS-8.1-1983, *Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors*
- ANSI/ANS-8.3-1986, *Criticality Accident Alarm Systems*
- ANSI/ANS-8.5-1986, *Use of Borosilicate-G/ass Raschig Rings as a Neutron Absorber in Solutions of Fissile Material*
- ANSI/ANS-8.6-1983, *Safety in Conducting Subcritical Neutron-Multiplication Measurements in Situ*
- ANS-8.7/ANSI N16.5-1975 (R1987), *Guide for Nuclear Criticality Safety in Storage of Fissile Materials*

- ANSI/ANS-8.9-1987, *Nuclear Criticality Safety Criteria for Steel-Pipe Intersections Containing Aqueous Solutions of Fissile Materials*
- ANSI/ANS-8.10-1983, *Criteria for Nuclear Criticality Safety Controls in Operations with Shielding and Confinement*
- ANSI/ANS-8.12-1987, *Nuclear/criticality Control and Safety of Plutonium-Uranium Fuel Mixtures Outside Reactors*
- ANSI/ANS-8.17-1984, *Criticality Safety Criteria for the Handling, Storage, and Transportation of LWR Fuel Outside Reactors*
- ANSI/ANS-8.19-1984, *Administrative Practices for Nuclear Criticality Safety*
- ANSI/ANS-8.20-1991, Nuclear Criticality Safety Training
- DNFSB Recommendation 94-4, *Deficiencies in Criticality Safety at* Oak Ridge Y-12 Plant.
- DNFSB Recommendation 93 6, *Maintaining Access to Nuclear Weapons Experience*
- DNFSB Recommendation 92-5, *Discipline of Operations in a Changing Defense Nuclear Facilities Complex*
- ESS-CS-101, *Nuclear Criticality Safety Program Elements,* Revision 0 (or latest revision)
- ESS-CS-102, *Nuclear Criticality Safety Approval,* Revision 1 (or latest revision)
- ESS-CS-103, *Nuclear Criticality Safety Calculations,* Revision 0 (or latest revision)
- Evaluation of the Nuclear Criticality Safety Program at the Y-12 Plant, March 21 through April 5,1995 (draft or latest revision)
- Guidelines for Preparing Criticality Safety Evaluations at Department of Energy Non-Reactor Nuclear Facilities, September 1,1992
- Implementation Plan for Defense Nuclear Facilities Safety Board Recommendation 94-4, *Deficiencies in Criticality Safety at Oak Ridge Y-12 Plant,* February 1995
- Martin Marietta Energy Systems, Inc. Readiness Assessment Implementation Plan for the Resumption of Receipt, Storage, and Shipment of Special Nuclear Materials at the Oak Ridge Y-12 Plant
- Nuclear Facility Operations Safety Assessment Team Report Draft for Rocky Flats Environmental Technology Site, March 27,1995
- Operational Safety Requirements, Buildings 9204-2 and 9204-2E, Revision 1 (or latest revision)

- Pantex Conduct of Operations Review
- Preliminary Evaluation of the Y-12 Nuclear Criticality Safety Program, Criticality Safety Approvals, and Operational Safety Requirements Supporting Receipt, Storage, and Shipment of Special Nuclear Materials
- Readiness Assessments by LANL and the Department of Energy (DOE) for Resumption of TA-55 Operations
- The Initial Report of Martin Marietta Energy Systems Evaluation of the Oak Ridge National Laboratory, September 17-28, 1990
- Type C Investigation of the Y-12 Plant Criticality Safety Approval Infractions Event at Building 9204-2E
- Y-12 Plant Nuclear Criticality Safety Program Description
- Y50-66-CS-326, *Nuclear Criticality Safety Operational Review* (latest revision)
- Y50-66-CS-327, *Nuclear Criticality Safety Incidents* (latest revision)
- Y70-150, *Nuclear Criticality Safety* (latest revision)
- Y70-160, *Criticality Safety Approval System* (latest revision)
- Y70-01-150, *General Nuclear Criticality Safety Requirements - Disassembly and Storage* (latest revision)
- Y70-37-19-071, *General Nuclear Criticality Safety Requirements - Building 9215 Enriched Uranium Operations* (latest revision)
- Y/DD-623, *Plan for Continuing and Resuming Operations,* October 1994
- Y/DD-669, *Nuclear Criticality Safety Management Plan for 1995 Resumption* (latest revision)
- Y/DD-673, *Management Plan for Assessing Y-12 Plant Criticality Accident Alarm System Coverage* (latest revision)

APPENDIX H - FINAL REPORT OUTLINE

To the extent practical, all supporting information should be typed in Word Perfect 5.1. Handwritten information such as relevant field notes from interviews or walkdowns, should be retained by the team members. The report will provide clearly defined technical bases for the conclusions, concerns, and findings. The following format is suggested for the final reports.

TASK 2 FINAL REPORT

Executive Summary

- Assessment Purpose
- Major Conclusions
- Major Recommendations
- Summation

Introduction

Background

Assessments

CSA Compliance

- Issues
- Conclusions
- Recommendations

Utility of Nuclear Criticality Safety Approvals

- Issues
- Conclusions
- Recommendations

OSR Compliance

- Issues
- Conclusions
- Recommendations

Special Operations - CSA and OSRs

- Issues
- Conclusions
- Recommendations

Completed Readiness Assessments

- Issues
- Conclusions
- Recommendations

Completed Actions in Near-Term Initiatives for Nuclear Criticality Safety

- Issues

Appendix C - Biographical Summaries of Assessment Team

TASK 3 FINAL REPORT

Executive Summary

- Assessment Purpose
- Major Conclusions
- Major Recommendations
- Summation

Introduction

Background

Assessment of Task 3 - Criticality Safety Program Review

Staffing Levels and Qualifications

- Issues
- Conclusions
- Recommendations

Maintenance and Change Control Programs

- Issues
- Conclusions
- Recommendations

Criticality Safety Evaluation Processes (including administrative controls and implementing procedures)

- Issues
- Conclusions
- Recommendations implementing procedures

Compliance with Applicable DOE Orders Governing Criticality Safety

- Issues
- Conclusions
- Recommendations

Training Effectiveness

- Issues
- Conclusions