

[MARTIN MARIETTA ENERGY SYSTEMS, INC.]

November 28, 1995

Mr. R.J. Spence
Department of Energy, Oak Ridge Operations
Post Office Box 2001
Oak Ridge, Tennessee 37831

Dear Mr. Spence:

Commitment 3.2 from the Department of Energy Implementation Plan for the Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 94-4

The enclosed report Y/NO-00009, "Lockheed Martin Energy Systems Evaluation of the Oak Ridge Y-12 Plant Nuclear Criticality Safety Program" was prepared to document completion of commitment 3.2 from the DOE Implementation Plan for DNFSB Recommendation 94-4. The commitment states the following:

"The LMES will evaluate the criticality safety and integrate the results of CSA evaluations and the results of the previous 12 months of internal or external criticality safety assessments into the final examination of operating procedures (i.e., CSAs, OSRs, Class 1 Procedures) can be more efficient, consistent with the Y-12 complex, and more usable."

If you have questions regarding this report, please call J.S. Rayside at 6-2296.

Sincerely,

F.P. Gustavson
Vice President
Defense and Manufacturing

FPG:RVS:sfr

Enclosure: As stated

Y-12

OAK RIDGE LOCKHEED MARTIN ENERGY SYSTEMS, INC.
Y-12 EVALUATION OF THE OAK RIDGE Y-12 PLANT
PLANT NUCLEAR CRITICALITY SAFETY PROGRAM

LOCKHEED MARTIN

November 1995

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**MANAGED BY
LOCKHEED MARTIN ENERGY SYSTEMS, INC.
FOR THE UNITED STATES
DEPARTMENT OF ENERGY**

Y/NO-00009

Lockheed Martin Energy Systems, Inc.

Evaluation of the Oak Ridge Y-12 Plant

Nuclear Criticality Safety Program

Commitment 3.2 of the
Implementation Plan for
Defense Nuclear Facilities Safety Board
Recommendation 94-4

November 1995

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LOCKHEED MARTIN ENERGY SYSTEM, INC.
for the
U. S. DEPARTMENT OF ENERGY
under contract DE-AC05-84OR21400

Team Co-Leaders Approval

E. C. Crume
11/16/95

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ACRONYM LIST

ANS	American Nuclear Society
ANSI	American National Standards Institute
ANSI/ANS-8.n	American National Standard for NCS published by ANS
CAA	criticality accident alarm

CAS	criticality alarm system (DOE 5480.24)
CAAS	criticality accident alarm system
CSA	criticality safety approval (Y-12)
DNFSB	DNFSB Defense Nuclear Facilities Safety Board
DOE	U. S. Department of Energy
DOE-ORO	U. S. Department of Energy Oak Ridge Operations Office
DSO	Disassembly and Storage Organization
EUO	Enriched Uranium Operations
LCO	Limiting Conditions of Operation document
LMES	Lockheed Martin Energy Systems, Inc.
LMUS	Lockheed Martin Utility Services, Inc.
MMES	Martin Marietta Energy Systems, Inc., predecessor of LMES
NCS	nuclear criticality safety
NCSE	nuclear criticality safety evaluation (LMES)
ORIG	Oak Ridge (DOE-ORO) Implementation Guidance
OSR	Operational Safety Requirements document
QE	Quality Evaluation
RSS	Receipt, Storage and Shipment
SAR	Safety Analysis Report
TSR	Technical Safety Requirement
WM	Waste Management
Y-12	Oak Ridge Y-12 Plant

SUMMARY

Task 3 of the U.S. Department of Energy (DOE) Implementation Plan for Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 94-4, *Deficiencies in Criticality Safety at the Oak Ridge Y-12 Plant*, requires that Lockheed Martin Energy Systems (LMES) fully evaluate the Nuclear Criticality Safety (NCS) Program for the facilities at the Oak Ridge Y-12 Plant. This evaluation was completed during the week of October 2-6, 1995, by an Assessment Team whose members were selected on the basis of their knowledge and experience from LMES and Lockheed Martin Utility Services (LMUS) staff and from subcontractors. None of the team members has any direct connection with the Y-12 Plant that could affect his or her independence. The Assessment Plan followed by the team uses criteria developed by LMES to satisfy Commitment 3.1 of Task 3. These criteria are based on industry standards, i.e., the American National Standards Institute/American Nuclear Society standards for NCS (ANSI/ANS-8.n standards, where "n" is the number of a particular standard) and DOE Order 5480.24, *Nuclear Criticality Safety*, and its interpretive guidance. The criteria were published as *Lockheed Martin Energy Systems Assessment Criteria for the Evaluation of the Oak Ridge Y-12 Plant Nuclear Criticality Safety Program*, Y/NO-00005, July 1995.

During the assessment, six new findings, three new observations, and a new proficiency were identified. Previously identified findings which had been entered into a formal tracking

system at least 30 days before the assessment were not identified as "new." Several possible findings and observations were discarded using that criterion if adequate progress towards correction was being made. None of the new findings are related to a major safety hazard, but all require corrective action. The new observations provide Y-12 Plant management with opportunities to strengthen the NCS Program. The systems engineering evaluation of the LMES standards program and examination of the operating procedures (CSAs, OSRs, Class 1 Procedures) led directly to one of the new findings and also to the proficiency. On the whole, the Assessment Team found that the Oak Ridge Y-12 Plant has a fundamentally sound NCS program that supports safe operations.

Also, the results of criticality safety approval (CSA) evaluations and the results of other internal and external NCS assessments made during the last 12 months have been implicitly integrated into this report. The Assessment Team noted many instances in which the Y-12 Plant had previously identified a deficiency and had initiated an appropriate corrective action. The results of previous assessments and self-identified deficiencies have been incorporated into the Y-12 Plant NCS Long Term Improvement Plan.

This final report documents the results of this assessment and satisfies Commitment 3.2 of Task 3. Completion of Task 3 is part of the overall plan to address DNFSB Recommendation 94-4.

1.0 INTRODUCTION

Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 94-4 regarding deficiencies in nuclear criticality safety (NCS) and conduct of operations at the Oak Ridge Y-12 Plant (Y-12) was issued on September 27, 1994, and subsequently accepted by the Secretary of Energy on November 18, 1994. In response to this recommendation, the U.S. Department of Energy (DOE) Implementation Plan for DNFSB Recommendation 94-4 was issued in February 1995 and presents a schedule of actions to address the recommendation. This final report addresses Commitment 3.2 under Task 3 in the 94-4 Implementation Plan:

"The MMES will evaluate the criticality safety and integrate the results of CSA evaluations and the results of the previous 12 months of internal or external criticality safety assessments into the final report. The conduct of a systems engineering evaluation of the MMES standards program and examination of operating procedures (i.e., CSAs, OSRs, Class 1 Procedures) can be more efficient, consistent with[in] the Y-12 complex, and more usable."

The full evaluation of the NCS Program for the facilities at the Y-12 site made by a Lockheed Martin Energy Systems (LMES; formerly MMES) NCS Assessment Team during the week of October 2-6, 1995, is the subject of this document. The scope of the evaluation is given in Section 2. The evaluation was made on the basis of an assessment to the six performance objectives given in Section 3. These performance objectives and their associated assessment criteria are from *Lockheed Martin Energy Systems Assessment Criteria for the Evaluation of the Oak Ridge Y-12 Plant Nuclear Criticality Safety Program*, Y/NO-00005, July 1995. They were derived from DOE Order 5480.24 and the directly referenced industry standards in order to address Commitment 3.1 under Task 3 of the 94-4 Implementation Plan. Details of the individual assessments to the six performance objectives are given in separate subsections of

Section 3. A systems engineering evaluation of the LMES standards program as it applies to NCS was completed. This evaluation consisted of a review of the LMES standards flowdown process starting at the highest level in LMES, followed by examination of the operating procedures (CSAs, OSRs, Class 1 Procedures) for evidence of adequate flowdown. The results are incorporated in the applicable separate subsections of Section 3.

Six new findings, three new observations, and one new proficiency were identified in the assessment. Previously identified findings that had been entered into a formal tracking system at least 30 days before the assessment were not identified as "new." Several possible findings and observations were discarded using that the criterion if adequate progress toward correction was being made. The assessment team reviewed previously identified findings, including, *Corrective Action Plan for the Y-12 Nuclear Criticality Safety Program, Criticality Safety Approvals, and Operational Safety Requirements Supporting Receipt, Storage, and Shipment of Special Nuclear Materials*, Y/NO-00002, and conducted a performance-based evaluation to ensure adequate progress was being made against planned corrective actions. None of the new findings are related to a major safety hazard, but all require corrective action. The new observations provide Y-12 management with opportunities to strengthen the plant NCS Program. The proficiency recognizes the exemplary approach that Y-12 management is using to ensure that operational issues relating to NCS are identified and resolved. The findings are included as Appendix A, the observations as Appendix B, and the proficiency as Appendix C.

The conclusions are summarized in Section 4. On the whole, the Assessment Team found the Oak Ridge Y-12 Plant to have a fundamentally sound NCS program that supports safe operations. In response to the direction given in Commitment 3.2, implicit or explicit integration of the results of CSA evaluations and the results of the previous 12 months of internal or external criticality safety assessments are incorporated where appropriate throughout the report. Biographical sketches of the Assessment Team members are included as Appendix D, definitions of technical terms as Appendix E, and a list of base documents consulted as Appendix F.

2.0 SCOPE

This assessment focused on the Y-12 NCS Program as it existed during the week of October 2-6, 1995. Four nuclear mission areas (Receipt, Storage, and Shipment; Enriched Uranium Operations; Disassembly and Assembly; and Quality Evaluation), essential nuclear operations performed on a continuing basis, and special nuclear operations as authorized by DOE were included in the scope of this assessment. At the time of the assessment only Receipt, Storage and Shipment had been authorized to resume normal operations. Depleted Uranium Operations was not assessed since it does not involve fissile material operations. In addition, the evolution of the documented NCS Program up to the week of the assessment and plans for program improvement were included in the scope of the assessment.

Recognizing that the Y-12 Plant had undergone many audits, assessments, and self-assessments since September 1994, only new findings, observations, and proficiencies were documented by this assessment. That is, previously identified findings that had been entered into a formal tracking system before August 31, 1995, were not in the scope of this assessment. The only exception would have been a finding that was assessed as not having

adequate corrective action progress since it was identified. No such exceptions were found.

3.0 DISCUSSION OF ASSESSMENT

The assessment was conducted according to an Assessment Plan based on criteria developed by LMES to satisfy Commitment 3.1 of Task 3 of the *DOE Implementation Plan for DNFSB Recommendation 94-4* issued in February 1995. These criteria are grouped under six performance objectives, numbered NCS.1 through NCS.6, and the assessments to each of the performance objectives are summarized in separate subsections below. The criteria are documented in *Lockheed Martin Energy Systems Assessment Criteria for the Evaluation of the Oak Ridge Y-12 Plant Nuclear Criticality Safety Program*, Y/NO-00005, July 1995.

In general, the methodology involved reviewing documents, interviewing Y-12 personnel, and touring areas of the plant where continuing and resumed nuclear operations were in progress. Vertical-slice assessments of some operations were made in which the criticality safety approval (CSA) and procedure documents were first reviewed, followed by personnel interviews at the supervisory level and the worker level, and direct observation of the operations.

3.1 ORGANIZATION/ADMINISTRATION

The performance objective in the area of organization and administration is NCS.1:

"The organizations responsible for nuclear criticality safety (NCS) at the site are in place, are adequately staffed, and are functioning in an effective manner."

The nine criteria for use in assessing whether this performance objective is being met are given in Section 2.1 of Y/NO-00005. Personnel at several different levels of Y-12 management and supervision were interviewed to investigate the consistency of NCS policy expectations. All higher tier personnel with direct NCS program responsibility were interviewed, including the Vice President for Defense and Manufacturing, the Manager of Nuclear Operations, the Y-12 Plant Manager, the Manager of Enriched Uranium Operations, and the Manager of Disassembly and Storage. There were extensive interactions with the Manager of the Y-12 NCS Department. Interviews of a sample of NCS Department staff were also conducted. Supervisors responsible for nuclear operations were interviewed, usually in conjunction with tours of operations.

Based on these interviews and reviews of base documentation such as those listed in Appendix F, there are no unresolved issues regarding this performance objective.

3.2 DEVELOPMENT OF NCS REQUIREMENTS

The performance objective in the area of development of NCS requirements is NCS.2:

"NCS requirements for site fissionable material operations are established on the basis of industry standards [American National Standards Institute/American Nuclear Society (ANSI/ANS) standards] and any additional requirements of DOE Order 5480.24."

The 26 criteria for use in assessing whether this performance objective is being met are given in Section 2.2 of Y/NO-00005. Several paths were followed in this assessment, all of which involved extensive reviews of documentation. The development of NCS requirements was traced from the enabling documentation (DOE Order 5480.24), the definition of the Y-12 NCS Program (Y70-150), through actual CSAs and their associated NCS evaluations (NCSEs). Interviews of Y-12 NCS Department staff were used to assess the adequacy of independent reviews of NCSEs. Field observations and line personnel interviews in Enriched Uranium Operations (EUO), Disassembly and Storage Organization (DSO), Waste Management (WM), and Quality Evaluation (QE) were used to assess compliance with the requirements of DOE Order 5480.24 and industry standards as defined in the assessment criteria of Y/NO-00005. Adherence to industry computational standards was assessed through reviews of verification/validation documentation (*Martin Marietta Y-12 Nuclear Criticality Safety Software Validation of KENO V.a on the HP 9000/series 700 workstation*, Y/DD-573; *A Computer Code to Perform Analysis of Criticality Validation Requests*, Y/DD-574; and *KENO Validation of U/Be Systems*, Y/DD-651) for computational codes used by the Y-12 INCS Department. Off-site shipments were not assessed.

Only one issue remained unresolved at the end of the assessment. This issue is identified as a finding against performance objective NCS.2, assessment criterion 16, in Appendix A.

3.3 IMPLEMENTATION OF NCS REQUIREMENTS

The performance objective in the area of implementation of NCS requirements is NCS.3:

"NCS requirements for site fissionable material operations are adequately implemented through flowdown, NCS training, and configuration management practices."

The 24 criteria for use in assessing whether this performance objective is being met are given in Section 2.3 of Y/NO-00005. Information to assess the implementation of NCS requirements was obtained through field observations; document and record reviews; personnel interviews at manager, supervisor, and worker levels; and walkthroughs of specific CSAs and procedures. Here, also, the systems engineering evaluation of the LMES standards program and examination of the operating procedures (CSAs, OSRs, Class 1 Procedures) were found useful.

Four issues remained unresolved at the end the assessment. In Appendix A, these are all identified as findings against performance objective NCS.3. The first is noncompliance with assessment criterion 8, the second is noncompliance with a specific combination of criteria 9.b and 10, the third is noncompliance with another aspect of criterion 10, and the last is noncompliance with criterion 15.

In addition to these findings, observations were made in regard to criteria 2 and 7. These observations are given in Appendix B.

3.4 ASSESSMENTS

The performance objective in the area of assessment is NCS.4:

"Procedures covering both operational NCS compliance and NCS program assessments are in place and are being performed at the site in an effective manner."

The eight criteria for use in assessing whether this performance objective is being met are given in Section 2.4 of Y/NO-00005. Much of the information used in the assessment came from an interview with the chairperson of the Y-12 Criticality Safety Committee and a review of the Committee's charter. NCS program documentation was reviewed and interviews were held with the Y-12 Health, Safety, Environment, and Accountability (HSEA) Manager, to whom the NCS Department reports, and the Y-12 Compliance Manager.

Based on these interviews and documentation reviews, there are no unresolved issues regarding this performance objective.

3.5 NCS INCIDENT REPORTING, TRACKING, TRENDING, RESOLUTION, AND LESSONS LEARNED

The performance objective in the area of NCS incident reporting, tracking, trending, resolution, and lessons learned is NCS.5:

"A program is in place and functioning effectively at the site to handle NCS incident reporting, tracking, trending, resolution, and lessons learned."

The two criteria for use in assessing whether this performance objective is being met are given in Section 2.5 of Y/NO-00005. Most of the information developed for this assessment came from documentation reviews and reviews of records and notes from meetings. This information was used in the systems engineering evaluation discussed above. Interviews at the worker and supervisor level made evident the close ties with conduct of operations at the Y-12 Plant.

Based on the information developed, there are no unresolved issues regarding this performance objective.

A proficiency was identified in regard to this performance objective. This proficiency is given in Appendix C.

3.6 CRITICALITY ACCIDENT ALARM SYSTEM AND EMERGENCY PLANNING

The performance objective in the area of criticality accident alarm system and emergency planning is NCS.6:

"Programs are in place at the site to assure criticality accident alarm (CAA) coverage where it is required by DOE Order 5480.24 and ANSI/ANS-8.3 and to assure proper emergency response in event of a criticality accident."

The 48 criteria for use in assessing whether this performance objective is being met are given in Section 2.6 of Y/NO-00005. Programmatic and emergency planning documentation,

engineering design and test records, and operational safety requirements documents (OSRs) were reviewed for information pertaining to this assessment. Facility walkthroughs and interviews with workers and supervisors were also employed.

Only one issue remained unresolved at the end of the assessment. This issue is identified as a finding against performance objective NCS.6, assessment criterion 34, in Appendix A.

In addition to this finding, an observation was made in regard to criterion 1. This observation is given in Appendix B.

4.0 CONCLUSIONS

A full evaluation of the NCS Program for the facilities at Y-12 was made during the week of October 2-6, 1995, by and LMES NCS Assessment Team using performance objectives and assessment criteria given in *Lockheed Martin Energy Systems Assessment Criteria for the Evaluation of the Oak Ridge Y-12 Plant Nuclear Criticality Safety Program*, Y/NO-00005, July 1995. The results of CSA evaluations and the results of other internal or external NCS assessments made during the previous 12 months have been implicitly integrated into this final report.

All of the assessments criteria in Y/NO-00005 excerpt the two pertaining to off-site shipments were checked for compliance. Six instances of noncompliance were found within the scope of the assessment and were presented to Y-12 management as findings; they are included as Appendix Z. While none of these things are related to a major safety hazard, all of them require corrective action. Three observations were found within the scope; they are included as Appendix B. These observations provide Y-12 management with opportunities to strengthen the Y-12 NCS Program. A proficiency was also found within scope; it is included as Appendix C. On the whole, and taking these findings, observations, and proficiency into account, the Assessment Team found that the Oak Ridge Y-12 Plant has a fundamentally sound NCS program that supports safe operations.

The Assessment Team noted many instances in which the Y-12 Plant had previously identified a deficiency and had initiated an appropriate corrective action. The results of previous assessments and self-identified deficiencies have been incorporated into the Y-12 Plant and NCS Long Term Improvement Plan.

This final report satisfies Commitment 3.2 of Task 3. Completion of Task 3 is part of the phased resumption of activities at the Y-12 Plant.

APPENDIX A

FINDINGS

Pages 11-17 are handwritten findings, if you need copies, please contact this office at (202) 586-3887.

APPENDIX B

OBSERVATIONS

Pages 18-20 are observations, if you require a copy, please contact this office at (202) 586-3887.

APPENDIX C

PROFICIENCY

Page 22 is an additional observation, if you require a copy, please contact this office at (202) 586-3887.

APPENDIX D

ASSESSMENT TEAM

BIOGRAPHICAL SKETCHES

W. Dale Baltimore

Mr. Baltimore is a Nuclear Criticality Safety (NCS) Engineer with Lockheed Martin Utility Services at the Paducah Gaseous Diffusion Plant (PGDP). He has been in the PGDP NCS Department for three years. He graduated from Tennessee Technological University with a B.S. degree in physics and also received an M.S. in physics from Murray State University. While at PGDP, Mr. Baltimore has performed various NCS audits, surveillances, and internal assessments. He has authored several NCS Evaluations (NCSEs) of PGDP plant operations and has also conducted technical reviews of NCSEs. Most recently, he has served as project leader for a high performance work team tasked with the development and implementation of the NCS documentation to support higher assay operations at PGDP. In this capacity, Mr. Baltimore provided technical support for plant modifications, served as technical manager for several subcontractors involved in the project, and coordinated implementation of the NCS requirements through plant training module development and procedure modifications. Dale has also supported the development of the NCS part of the NRC application in preparation for PGDP becoming subject to NRC regulatory oversight.

GEORGE H. BIDINGER

Mr. Bidinger, co-leader of the assessment, has more than 36 years experience in applied nuclear criticality safety. He is currently working as a consultant at LMUS performing NCS analyses and peer reviews for the Portsmouth Gaseous Diffusion Plant. His 1995 audit and assessment experience includes a team review of the LMES Y-12 Plant NCS program and an audit of the Babcock and Wilcox NCS Program. Other recent projects include performing NCS safety analyses for plant operation and for a shipping container for Babcock and Wilcox, NCS training at the LMES Y-12 Plant and at the Short Course sponsored by the University of

New Mexico, and an NCS analysis of AECL uranium storage practices for the Atomic Energy Control Board. Prior to his private consulting, Mr. Bidinger worked for 30 years in the USNRC/AEC. He was the group leader of the nuclear criticality, chemical, fire, environmental, and radiation safety engineers who performed safety reviews and prepared NRC safety evaluation reports and licenses. Other major activities included technical reviews of applicants' NCS programs for research, centrifuge enrichment, and fabrication of test, research, commercial, and naval reactor fuel; inspections and assessments of NRC licensees' operations; senior staff technical oversight and advice for all NRC fuel facility inspectors; and development of NCS requirements for NRC staff reviews and technical content of NRC license applications. Prior to joining the NRC, Mr. Bidinger was the nuclear safety officer at Coors Porcelain Nuclear Division, where fuels for the TORY IIC reactor program were produced, and a development physicist in the criticality group at the Dow Chemical Rocky Flats Plant. Mr. Bidinger has been active in the ANS/NCSD and has been a member of several ANSI/NS-8 standards writing groups. He was the NRC representative to the ANS N16 Standards Committee and continues as a private member. He is the author/co-author of several topical reports on in-situ experiments and of several ANS papers. Mr. Bidinger has a B.S. and M.S. degrees in physics from John Carroll University.

JOHN F. COX

Mr. Cox has over 25 years experience in safety assessment and regulatory compliance at DOE facilities and commercial nuclear plant. He is co-founder/owner and primary consultant with PHOENIX Consultants, Inc., Knoxville, Tennessee. Mr. Cox is presently supporting Oak Ridge National Laboratory (ORNL) and Lockheed Martin Energy Systems (LMES) in development and implementation of compliance assurance programs and Price-Anderson Amendments Act (PAAA) implementation. He was a key participant in the development of compliance programs at LMES for implementation of DNFSB Recommendation 90-2. In this capacity, he has been directly involved in facility assessments of ORNL and K-25 for compliance with DOE Orders, PAAA nuclear safety requirements, and other ES&H requirements. Also, Mr. Cox has been involved in numerous facility assessments across the DOE complex and at commercial nuclear plants including the Idaho National Engineering Laboratory (INEL), Rocky Flats Plant, Savannah River Plant, Portsmouth Gaseous Diffusion Plant, Sequoyah Nuclear Plant, and Watts Bar Nuclear Plant. These assessments supported resumption of operations at the Rocky Flats Plant and Savannah River Plant, involved DOE Tiger Team preparation (self-assessment) and corrective actions at LMES K-25 site and INEL facilities, supported restart of the Sequoyah Nuclear Plant, and identified actions required for President of Tenera, L.P., having responsibility for Government Services Operations Performance, which provided consulting services to DOE facilities including INEL, MMES, the Savannah River Plant, Hanford, and the Rocky Flats Plant. Before joining Tenera, L.P., Mr. Cox had 18 years nuclear safety, licensing, and engineering experience with the Tennessee Valley Authority as Engineering Project Manager Sequoyah Nuclear Plant; Assistant Chief Nuclear Engineer; Licensing Manager; and licensing and engineering design positions. Mr. Cox has a B.S. in mechanical engineering from the University of Tennessee, Knoxville. He has authored papers, reports, and meeting presentations on nuclear plant licensing, regulatory compliance, configuration management, and design baseline reconstitution programs.

E. CHARLES CRUME, JR.

Dr. Crume, co-leader of the assessment, has over 40 years experience as a physicist, with over 20 years in experimental nuclear criticality and nuclear criticality safety (NCS). He is currently employed as a consultant by PAI, Inc., supporting Lockheed Martin Energy Systems (LMES) in the areas of NCS technical reviews and NCS procedure development. He is also currently employed as a consultant by Pragmatics, Inc., supporting the Chemical Technology Division of ORNL on technical NCS issues relating to remediation of the Molten Salt Reactor Experiment (MSRE) facility. His audit and assessment experience includes reviews of operation of the Bulk Shielding Reactor (BSR) at ORNL and of reactor fuel element manufacturing at the General Electric Company Nuclear Fuels and Components Manufacturing Facilities. Prior to joining PAI, Inc., Dr. Crume was head of the ORNL NCS Section, which he worked to build up to replace the previous, less structured, NCS compliance and oversight function at ORNL. Before that, he performed experimental and theoretical research in nuclear fusion energy following a period as a criticality safety specialist at the Oak Ridge Y-12 Plant. While at Y-12, he worked on some of the first applications of the KENO criticality code to the NCS of manufacturing operations. Before joining the Y-12 Plant, Dr. Crume was Operations Supervisor of the Connecticut Advanced Nuclear Engineering Laboratory (CANEL) reactor critical experiment facility. He is the author of numerous papers, reports, and meeting presentations on NCS, nuclear fusion, and other topics. Dr. Crume has been active in ANSI/ANS NCS standards work and is currently a member of the ANSI/ANS-8.7 writing group. He has an A.B. in physics from Wabash College and M.A. in physics from Wesleyan University, and his Ph.D. in physics is from the University of Tennessee.

DONNA M. D'AQUILA

Ms. D'Aquila is the Nuclear Criticality Safety (NCS) Department Manager at the Portsmouth Gaseous Diffusion Plant. She has worked in the field of NCS for the past thirteen years. In her current position, she functions both as manager of the department and as an NCS technical specialist. Prior to this assignment, she worked in the Nuclear Safety Department at the Feed Materials Production Center (now the Fernald Environmental Restoration Management Company) as an NCS engineer. In this capacity, she performed NCS training and conducted analyses for fissile material shipments and process operations at the facility. From 1982 until 1985, she was on the NCS staff at the Portsmouth Gaseous Diffusion Plant. Ms. D'Aquila holds a B.S. in nuclear engineering from the University of Cincinnati and has completed all course work towards an M.S. in nuclear engineering at The Ohio State University. Ms. D'Aquila is active on the writing group for ANSI/ANS-8.23, *Nuclear Criticality Accident Emergency Planning and Response*, and is a past Chair of the NCS Division of the American Nuclear Society.

DAVID M. MCGINTY

Mr. McGinty has over 20 years of experience in the operation and management of nuclear facilities, with a primary focus on nuclear reactors. He is currently Compliance Assurance Program Manager at Oak Ridge National Laboratory (ORNL). This program is designed to implement a sound standards management program based on the Standards/Requirements Identification Documents (S/RIDs) approved by DOE. Coordination of requirements associated with the Price-Anderson Amendments Act (P-AAA) is also part of this program. Mr. McGinty earlier served as the Compliance Section Manager for the ORNL Research Reactors Division (RRD). He was part of the management restart team for the High Flux Isotope Reactor (HFIR) during 1987-1989. He was the chairman of the Plant Operations

Review Committee for RRD from 1988 through 1994. This committee established operating policies for the division and performed the final management review of procedures used in the operation of facilities within RRD.

From April 1984 until 1987, he served as a technical assistant to the manager of HFIR. In this capacity, he qualified as a senior reactor operator at HFIR, provided shift relief to reactor supervisors at HFIR, performed technical reviews of operating procedures, and completed numerous management assessments. Before joining ORNL, he served from 1977 to 1984 as a reactor operator and reactor physicist at the 10-MW University of Missouri Research Reactor (MURR), the highest-power university-operated research reactor in the country. As reactor physicist, he was responsible for oversight of the quality assurance program for the fuel fabricator, security and transportation requirements associated with the shipment of fuel, fuel cycle management, and support for various license submittals to the NRC. From 1979 to 1984, he also maintained qualifications as a senior reactor operator at this research reactor. Before joining MURR, he served as a reactor operator in the U.S. Navy and qualified on the prototype S5G facility in Idaho and later on an S5W reactor on board a submarine stationed at Charleston, S.C. His technical specialty in the Navy was electronic controls associated with the operation of reactors.

Mr. McGinty has an M.S. degree in nuclear engineering from the University of Missouri and a B.S. degree in mathematics from Berea College.

DANNY A. WALKER

Mr. Walker has over 15 years experience in the safety analysis discipline, which includes unreviewed safety question determination (USQD) preparation and review, configuration management, accident analysis, Technical Safety Requirements (TSRs), and has had significant interfaces with NCS issues relative to safety documentation. He is currently employed by Lockheed Martin Energy Systems (LMES) in Central Engineering Services, and is currently leading the accident analysis effort for the Gaseous Diffusion Plant Safety Analysis Reports. He led the development of the safety analysis to allow operation of the Paducah Gaseous Diffusion Plant at a higher assay (from 2 to 5 weight percent ²³⁵U), which mostly involved NCS-related issues. Before joining LMES, Mr. Walker was employed by the Tennessee Valley Authority for nine years. He led a Design Bases Reconstitution effort for the Browns Ferry Nuclear Plant that involved significant assessments and evaluations as well as the development of methods to accomplish the tasks. Mr. Walker has a B.S. in electrical engineering from the University of Tennessee.

APPENDIX E

DEFINITIONS

finding a direct violation of a requirement. Findings require corrective actions. For the purpose of this assessment, only "new" findings were identified. That is, anything discovered in previous audits or assessments, including self-assessments, which were completed at least 30 days before this assessment starts, and which have been

entered into a formal tracking system, was not identified as "new." The only exceptions would have been findings that were assessed as not having adequate corrective action progress since they were identified, but there were none.

observation a condition that could be improved or strengthened. An observation is not a requirement violation; it is a method by which opportunities for managerial or programmatic improvements may be identified. Only "new" (see definition of "finding") observations were identified.

proficiency an exemplary practice or an area of performance excellence that the team feels should be brought to the attention of management. Only one "new" (see definition of "finding") proficiency was identified.

APPENDIX F

BASE DOCUMENTS CONSULTED

1. DNFSB Recommendation 94-4, *Deficiencies in Criticality Safety at Oak Ridge Y-12 Plant*
2. DOE Order 5480.24, *Nuclear Criticality Safety*, 8/12/92
3. DOE Implementation Guidance ORIG N 5480.24, *Nuclear Criticality Safety*, " 5/14/93, and Attachment
4. Y/AD-622, *Type C Investigation of the Y-12 Plant Criticality Safety Approval Infractions Event at Building 9204-E on September 22, 1994*, October 1994
5. Y/AD-623, *Plan for Continuing and Resuming Operations*, October 1994.
6. Y/DD-679, *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*, April 1995
7. Y/NO-0002, *Corrective Action Plan for the Y-12 Nuclear Criticality Safety Program, Criticality Safety Approvals, and Operational Safety Requirements Supporting Receipt, Storage, and Shipment of Special Nuclear Materials*,
8. ESS-CS-101, *Nuclear Criticality Safety Program Elements*, Revision 0
9. ESS-CS-102, *Nuclear Criticality Safety Approval*, Revision 1
10. ESS-CS-103, *Nuclear Criticality Safety Calculations*, Revision 0
11. ESS-CS-104, *Criticality Accident Alarm System (CAAS)*, Revision 0
12. Y70-150, *The Y-12 Plant Nuclear Criticality Safety Program Procedures*, latest revision

13. Y70-150, *Criticality Accident Alarm System*, latest revision
14. 1993 and 1994 reports of the annual NCS reviews by the Y-12 Criticality Safety Committee. (The 1993 report is included as Appendix E of Document 2, above.)