The Secretary of Energy
Washington, DC 20585

November 22, 2002

The Honorable John T. Conway
Chairman
Defense Nuclear Facilities Safety Board
625 Indiana Avenue, NW
Suite 700
Washington, D.C. 20004

Dear Mr. Chairman:

Enclosed is the Department's Quality Assurance Improvement Plan for Defense Nuclear Facilities. This plan describes the Department's actions to improve implementation of quality assurance as practiced by the Department of Energy and its contractors in the design, procurement, construction, operation, and maintenance of its vital safety systems. The Department appreciates the Board's technical reports and insights into the quality assurance program improvements. Safety-related software quality assurance will be addressed separately in response to your Recommendation 2002-1 issued on September 23, 2002.

We will keep you and your staff informed of our progress in meeting the commitments in this Improvement Plan. Mr. Raymond Hardwick in the Office of Environment, Safety and Health, at (301) 903-4244, is available to answer any questions related to this matter.

Sincerely,

Spencer Abraham

Enclosure

cc:
M.Whitaker, S-3.1

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U. S. Department of Energy

Quality Assurance Improvement Plan for Defense Nuclear Facilities

Washington, D.C. 20585

October 21, 2002

EXECUTIVE SUMMARY

This Improvement Plan describes the Department of Energy's (DOE) actions to improve the implementation of quality assurance (QA) at the Department's defense nuclear facilities. It was developed in response to issues raised by Environmental Management (EM) and National Nuclear Security Administration (NA) assessments conducted during 2001, reviews of operational performance data, and concerns identified by the Defense Nuclear Facilities Safety Board (DNFSB) in technical reports and public meetings.

The Improvement Plan initially presented three main goals. Goal 1 addresses site-specific weaknesses and corrective actions, Goal 2 considered improvements in the quality assurance program as it relates to safety-related software, and Goal 3 focuses on long-term improvements in the QA program. In September 2002, the DNFSB issued Recommendation 2002-1 "Quality Assurance for Safety-Related Software." In recognition of that Recommendation, Goal 2 and associated actions addressing safety-related software quality assurance have been removed from this Plan. The safety-related software quality assurance improvement actions will be addressed separately in response to Recommendation 2002-1. However, the Department will continue to move forward in this area, as well as in the areas covered by Goals 1 and 3 of this Plan. To facilitate the accomplishment of Goals 1 and 3, the Improvement Plan provides background information, a summary of the issues, action items, deliverables, completion dates, and lead responsible position within DOE.

Goal 1 focuses on "... the weaknesses in the quality assurance program that affect safe operation of items serving vital safety functions at the Department's defense nuclear facilities." The action items associated with this goal are aimed at resolving the weaknesses identified by the DNFSB 2000-2 Recommendation Implementation Plan Phase I & II assessments conducted by EM, the QA assessments conducted in 2001 by NA, and other sources. With the exception of software QA, these weaknesses are primarily related to the implementation of existing DOE requirements. The Improvement Plan requires the identification and resolution of the site-specific findings, completion of corrective measures and revisions to the *Functions, Responsibilities and Authorities Manual* (FRAM) and related lower-tier documents to clarify DOE responsibilities for QA program implementation and oversight.

Goal 3 involves several initiatives to "assure the effectiveness of quality assurance programs for items performing vital safety functions at the Department's defense nuclear facilities." The action items include a validation that the contractors have effectively integrated their QA program with Integrated Safety Management Systems (ISMS), integration of QA in the oversight process, EM contract change control and verification of implementation of the quality assurance program.

TABLE OF CONTENTS

Background 1

Goals and Action Items 2

Goal 1 2

Goal 2 9

Goal 3 10

Improvement Plan Management and Implementation 15

References 16

BACKGROUND

In the summer of 2001, the Department of Energy (DOE) initiated a process to review the status of quality assurance practices. This review included a series of Field assessments conducted by the Office of Environmental Management (EM) and the National Nuclear Security Administration (NA) Headquarters organizations. Line management review of the results of these assessments revealed several areas where improvements can be made. Additionally, the Defense Nuclear Facilities Safety Board (DNFSB) issued Technical Report 25 - *Quality Assurance for Safety-Related Software at Department of Energy Defense Nuclear Facilities,* Technical Report 31 - *Engineering Quality into Safety Systems* and conducted three public meetings on the subject of quality assurance. The technical reports and public meetings identified quality assurance problems from the perspective of the DNFSB.

The Deputy Secretary of Energy assigned Mr. Ray Hardwick, a senior Departmental manager in the Office of Environment, Safety and Health, to coordinate the development of an integrated plan that defines the actions necessary to improve the implementation of quality assurance and provide the necessary leadership during the execution of these actions. To facilitate the identification of the goals and action items in this Improvement Plan, an analysis of the EM and NA review results, operational performance data and the DNFSB concerns was conducted. That analysis resulted in the identification of crosscutting quality assurance issues. These issues are listed in the applicable sections of the Improvement Plan, along with the goals and the actions that will make improvements in those areas.

In September 2002, the Improvement Plan was in the final senior management concurrence phase when the Defense Nuclear Facilities Safety Board issued Recommendation 2002-1 "Quality Assurance for Safety-Related Software." In recognition of that Recommendation, Goal 2 and associated actions addressing safety-related software quality assurance have been removed from this Plan. The safety-related software quality assurance improvement actions will be addressed separately in response to Recommendation 2002-1.

GOALS AND ACTION ITEMS

GOAL 1

Correct the weaknesses in the quality assurance program that affect safe operation of items serving vital safety functions at the Department's defense nuclear facilities.

Background

With the exception of software quality assurance, the quality assurance program requirements and guidance in place in the Department are adequate. Improving the implementation of these existing requirements is necessary to enhance the effectiveness of the quality assurance program.

NA and EM organizations conducted quality assurance (QA) assessments in 2001. NA reviewed quality assurance implementation for recently completed or in progress construction projects at six of their Field offices, with an emphasis on vital safety systems. They formally released the results of these reviews in October 2001. EM evaluated the implementation of quality assurance requirements at four of their Field offices and their respective contractors.
Although the reviews conducted by EM and NA were not comprehensive assessments of the Department's quality assurance programs, they did identify site-specific and common issues. EM completed Phase I & II assessments of vital safety systems with positive results. Corrective actions are being taken to resolve the identified issues.

This goal, and the related actions will provide for analysis of assessment information to determine QA improvement areas, resolution of QA implementation issues, verification that the corrective actions were implemented and effective, and identification of Federal roles and responsibilities in the Functions, Responsibilities and Authorities Manual (FRAM) and related lower-tier Functions, Responsibilities and Authorities (FRA) documents.

Issues

Some of the common issues identified by the EM and NA reviews include:

- Contractor implementation of existing quality assurance requirements and industry standards is inconsistent and sometimes ineffective.

- The flowdown of quality assurance requirements to all tiers of subcontractors and suppliers is inconsistent and weak.

- The quality assurance roles and responsibilities of personnel involved in design, procurement or receipt inspection are not clearly defined and/or are not being effectively implemented.

- DOE oversight has been ineffective.

Improvement Actions

Action 1.1 *Analyze the results of EM and NA assessments. Request that appropriate actions be taken to address issues identified as affecting safe operation of vital safety systems.*

1.1.1 Review the results of the NA QA assessments conducted in 2001, as well as other applicable sources, and request that appropriate actions be taken to address issues identified as affecting safe operation of vital safety systems.

Deliverable:	Memorandum to Field and Headquarters managers requesting that appropriate action is taken.
Completion Date:	Completed
Lead Responsibility:	Deputy Administrator for Defense Programs

1.1.2 Review the results of the EM DNFSB Recommendation 2000-02 Phase I & II assessments, as well as other applicable sources, and request that appropriate actions be taken to address issues identified as affecting safe operation of vital safety functions.

Deliverable:	EM Review Team develops recommendations and Field/Operations Offices submit corrective action plans.
Completion Date:	January 2003
Lead Responsibility:	Assistant Secretary for Environmental Management

Action 1.2 *NA and EM will provide a schedule for oversight reviews to verify effectiveness of identified issues.*

1.2.1 NA will provide a schedule for oversight reviews to verify the effectiveness of actions taken to address identified issues.

Deliverable:	Schedule of oversight reviews
Completion Date:	November 2002
Lead Responsibility:	NA ES&H Advisor (NA-3.6)

1.2.2 EM will integrate Phase II assessments into the EM oversight programs and provide a schedule for vital safety systems oversight reviews.

Deliverable:	Schedule of oversight reviews, performance measures and Quarterly Reports
Completion Date:	March 2003
Lead Responsibility:	Assistant Secretary for Environmental Management

Action 1.3 *Implement DOE Policy P 450.5 Line Environment, Safety and Health Oversight reviews*

1.3.1 NA, in accordance with its March 1, 2002, Memorandum (J. Gordon to NNSA Field Elements), will conduct Field Element performance oversight reviews in accordance with Policy P 450.5, including QA implementation oversight of the contractor.

Deliverable:	Report indicating QA-related results of P 450.5 Field Element performance oversight reviews.
Completion Date:	December 2003
Lead Responsibility:	Deputy Administrator for Defense Programs

1.3.2 EM will establish Headquarter Operational Oversight Expectations.

Deliverable:	EM Operational Oversight Policy and Expectations Memorandum
Completion Date:	January 2003
Lead Responsibility:	Assistant Secretary for Environmental Management

1.3.3 EM will establish oversight schedules for HQ and Field/Operations Offices.

Deliverable:	Oversight Schedules, performance measures, and Quarterly Reports
Completion Date:	February 2003
Lead Responsibility:	Assistant Secretary for Environmental Management and Head of Field/Operations Offices

1.3.4 EM will conduct oversight reviews on schedule and track performance for HQ and Field/Operations Offices.

Deliverable:	Assessments conducted on schedule, corrective action plans and performance measures.
Completion Date:	June 2003
Lead Responsibility:	Assistant Secretary for Environmental Management and Head of Field/Operations Offices

1.3.5 EM will establish corrective action management systems for HQ and Field/Operations Offices and establish performance measures.

Deliverable:	Corrective Action Management System and performance measures
Completion Date:	January 2003
Lead Responsibility:	Assistant Secretary for Environmental Management and Head of Field/Operations Offices

1.3.6 EM will perform corrective action management system self-assessments for HQ and Field/Operations Offices and Field/Operations Offices will perform oversight assessments on contractors corrective action management system.

Deliverable:	Corrective Action Management System DOE Self-Assessments and DOE Contractor Oversight Assessment

Completion Date: April 2003

Lead Responsibility: Assistant Secretary for Environmental Management and Head of Field/Operations Offices

Action 1.4 *Review the Functions, Responsibilities and Authorities Manual (FRAM) and ensure it incorporates Federal responsibilities defined in the Quality Assurance Rule and Order, including the responsibilities for overseeing the contractor's quality assurance program.*

1.4.1 Develop Draft revision to the FRAM and issue for comment through the directives system.

Deliverable: FRAM issued for comment through the directives system.

Completion Date: July 2002

Lead Responsibility: Assistant Secretary for Environment Safety And Health

1.4.2 Review, approve and issue FRAM revision through the directives system.

Deliverable: FRAM approved and issued through the directives system.

Completion Date: November 2002

Lead Responsibility: Assistant Secretary for Environment Safety And Health

1.4.3 Update the EM Headquarters and Field FRA documents to incorporate Federal responsibilities defined in the Quality Assurance Rule and Order, including the responsibilities for overseeing the contractor's quality assurance program.

Deliverable: EM FRA documents updated and approved

Completion Date: February 2003

Lead Responsibility: Assistant Secretary for Environmental Management (HQ FRAs); Heads of Field/Operations Offices (Field FRAs)

1.4.4 Update the NA Headquarters and Field FRA documents to incorporate Federal responsibilities defined in the Quality Assurance Rule and Order, including the responsibilities for overseeing the contractor's quality assurance program.

Deliverable: NA FRA documents updated and approved

Completion Date: January 2003 (HQ) & May 2003 (Field)

Lead Responsibility: Deputy Administrator for Defense Programs (Field FRAs); Associated Administrator for Facilities and Operations (HQ FRA)

Action 1.5 *EM will maintain Integrated Safety Management Systems (ISMS) by approving annual revisions (DOE and Contractor) or approving basis for no annual revision, and establishing schedules for revisions and re-verifications (DOE and Contractor) to approved ISMS.*

Deliverable: DOE and Contractor ISMS revision and re-verification schedules.

Completion Date: December 2002

Lead Responsibility: Assistant Secretary for Environmental Management and Head of Field/Operations Offices

1.5.1 EM will perform self-assessment of DOE ISMS and oversight of contractors ISMS.

Deliverable: DOE ISMS self-assessment, Oversight assessments of Contractor ISMS and oversight schedules

Completion Date: March 2003

Lead Responsibility: Assistant Secretary for Environmental Management and Head of Field/Operations Offices

1.5.2 EM will include an annual ISMS declaration from EM Field/Operations Office Manager as part of the annual budget submission.

Deliverable: EM Memorandum directing revision to budget submission protocols to require annual declaration from EM Field/Operations Office and Contractors on ISMS.

Completion Date: December 2002

Lead Responsibility: Assistant Secretary for Environmental Management

GOAL 2

This Goal previously addressed safety-related software quality assurance program improvements. The Goal's associated actions related to establishing a program that ensured safety analysis, design and instrument and control (I&C) software reliably and effectively supported the safe operation of items performing vital safety functions at the Department's defense nuclear facilities. Those actions will be addressed separately in response to Defense Nuclear Facilities Safety Board Recommendation 2002-1 "Quality Assurance for Safety-Related Software." It should be noted that some of the actions have been initiated and will continue.

GOAL 3

Assure the effectiveness of quality assurance programs for items performing vital safety functions at the Department's defense nuclear facilities.

Background

There are several initiatives that will support the long-term implementation of an effective quality assurance program. To be successful in the long-term, there must be an effective infrastructure in place to support the implementation of the program. That infrastructure includes requirements (rules, policies, orders, etc.), adequate management attention, and an effective oversight process. Long-term implementation must also include the integration of quality assurance program requirements with integrated safety management systems.

In March 2001, the DNFSB issued Technical Report 31 - *Engineering Quality into Safety Systems*. The report was a precursor to the DNFSB's public meetings on Quality Assurance and reflects their concerns related to the Department's programs for ensuring the reliability and operability of structures, systems and components serving vital nuclear safety functions at defense nuclear facilities. Their report also identified issues related to the infrastructure required to ensure effective implementation. The assessments conducted by NA and EM in 2001 also identified several issues related to the infrastructure required to support the long-term implementation of an effective quality assurance program.

Issues

The following three issues emerged from both the NA and EM assessments and the DNFSB's comments:

- Integration of contractor quality assurance programs and safety management systems is incomplete or indeterminate.

- Oversight of quality assurance programs and requirements implementation is inconsistent, lacking in rigor, and sometimes non-existent.

- Implementation of quality assurance programs is inconsistent in applying appropriate QA requirements to Safety Systems (i.e., design, procurement, fabrication, construction, and operation). There is a need to focus the Department's highest priority on QA as applied to Safety Systems in order to identify needed corrective actions, resource allocation and improvements.

Improvement Actions

Action 3.1 *NA will validate that contractors are complying with 10 CFR 830.121(c)(2) regarding integrating QA with ISMS.*

Deliverable: Validation Memorandum to Deputy Administrator for Defense Programs

Completion Date: February 2003

Lead Responsibility: NA Field Office Managers

Action 3.2 *NA will ensure that programs and processes are in place that provides the oversight of quality assurance programs consistent with DOE Policy P 450.5 and DOE Order O 414.1.*

3.2.1 NA Field and Headquarters organizations will evaluate quality assurance programs as part of their integrated assessment process consistent with DOE Policy P 450.5 and DOE Order O 414.1.

Deliverable: Acknowledgement Memorandum to Deputy Administrator for Defense Programs indicating that Field and Headquarters organizations are assessing quality assurance programs.

Completion Date: May 2003

Lead Responsibility: NA ES&H Advisor (NA-3.6) and NA Field Office Managers

3.2.2 Verify that Field and Headquarters organizations are assessing quality assurance programs consistent with DOE Policy DOE P 450.5 and DOE Order O 414.1.

Deliverable: Memorandum to Deputy Administrator for Defense Programs indicating that implementation of the quality assurance assessment process has been effectively implemented within NA.

Completion Date: October 2003

Lead Responsibility: NA ES&H Advisor (NA-3.6) and NA Field Office Managers

Action 3.3 *NA will validate and verify that quality assurance programs are effectively implemented for the design, procurement, fabrication, construction and operation of Safety Systems.*

Deliverable: Validation Memorandum to Deputy Administrator for Defense Programs

Completion Date: January 2004

Lead Responsibility: NA Field Office Managers

Action 3.4 *EM will promulgate processes and procedures for FRA and QA document requirements.*

Deliverable: Approved HQ FRA/QA implementation matrix and Field/Operations Office Manager approved Field/Operations Office FRA/QA implementation matrix

Completion Date: April 2003

Lead Responsibility: Assistant Secretary for Environmental Management and Heads of EM Field/Operations Offices

Action 3.5 *EM establish contract change control expectations.*

Deliverable: EM Contract Board

Completion Date: Completed

Lead Responsibility: Assistant Secretary for Environmental Management

Action 3.6 *EM establish and implement contract change control process, including establishing performance measures and incentives.*

Deliverable: EM approved contract change control protocol, performance measures and incentives.

Completion Date: December 2002

Lead Responsibility: Assistant Secretary for Environmental Management and Heads of EM Field/Operations Offices.

Action 3.7 *Ensure that DOE and Contractor Annual updates to ISMS and QA Program Descriptions are integrated and occur.*

Deliverable: EM approved schedules for annual revisions or basis for revision exemption

Completion Date: March 2003

Lead Responsibility: Assistant Secretary for Environmental Management and Heads of EM Field/Operations Offices

Action 3.8 *EM will integrate assessment of vital safety systems into DOE oversight and contractor self-assessment for ISMS and QA to ensure quality of design, procurement, fabrication, construction and safe operation of Safety Systems.*

Deliverable: EM oversight and Self Assessment Schedules, and performance measures and assessment of performance and effectiveness of Action 1.2.2

Completion Date: July 2003

Lead Responsibility: Assistant Secretary for Environmental Management and Heads of EM Field/Operations Offices

IMPROVEMENT PLAN MANAGEMENT AND IMPLEMENTATION

As designated by the Deputy Secretary of Energy, the coordination, integration and tracking of this Improvement Plan are the responsibilities of Mr. Ray Hardwick in the Office of Environment, Safety and Health. As the Quality Assurance Improvement Team Leader, Mr. Hardwick is responsible for periodically updating senior management and other interested personnel on the status of completing the Action Items in the Improvement Plan. The Improvement Team Leader is also responsible for issuing periodic reports on the status of completing action items. If the Improvement Plan requires a revision or update, the Quality Assurance Improvement Team Leader will coordinate that process.

The management and accomplishment of the Action Items are the responsibility of the individuals listed in the Improvement Plan. With the exception of developing or revising Departmental documents such as guides or standards, that responsibility primarily rests with the EM and NA managers in the Headquarters and Field. These managers have the responsibility and accountability for the implementation of the quality assurance programs, and as such are responsible for ensuring that the Action Items are effectively implemented. The resources necessary to accomplish the Action Items in this Improvement Plan are provided by the organization responsible for the Action Items and are considered to be within current QA program implementation resources.

REFERENCES

The following documents are referenced in this Improvement Plan or provide additional background information to help understand the basis for the actions described in this Improvement Plan

- Defense Nuclear Facilities Safety Board (DNFSB) Technical Report 25 *Quality Assurance for Safety-Related Software at Department of Energy Defense Nuclear Facilities.*
- DNFSB Technical Report 31 *Engineering Quality into Safety Systems*
- DNFSB letter to the Deputy Secretary of Energy dated February 22, 2002 related to Quality Assurance
- DNFSB Recommendation 2000-2 Implementation Plan
- *DOE Policy P 450.5 Line Environment, Safety and Health Oversight*
- *Functions, Responsibilities and Authorities Manual (FRAM)*
- DOE Rule 10 CFR 830 Subpart *A Quality Assurance*
- DOE Order 414.1A, *Quality Assurance*
- Implementation Guide DOE G 414.1-2, *Quality Assurance Management System Guide*
- Implementation Guide DOE G 420.1-1, *Nonreactor Nuclear Safety Design Criteria and Explosives Safety Criteria Guide*
- DOE STD 3009, *Preparation Guide for U.S. DOE Nonreactor Nuclear Facility Safety Analysis Reports*
- DNFSB Recommendation 2002-1,Quality Assurance for Safety-Related Software, issued September 23, 2002