



## Department of Energy

Washington, DC 20585

December 18, 2003

The Honorable John T. Conway  
Chairman  
Defense Nuclear Facilities Safety Board  
625 Indiana Avenue, NW  
Washington, D.C. 20004-2941

Dear Mr. Chairman:

This letter reports the completion of Commitment 4.4.3 of the Department's Implementation Plan for Software Quality Assurance (SQA) in response to Defense Nuclear Facilities Safety Board Recommendation 2002-1. Commitment 4.4.3 states that the Department will:

"Establish relationships and actively participate with outside groups, organizations, companies, and agencies that have an interest in SQA that is similar to that being addressed by this Implementation Plan. This participation will assist the Department in benchmarking, research and development, and sharing of lessons learned and new technologies."

The enclosed report documents the completion of Commitment 4.4.3 and summarizes ongoing activities resulting from commitment actions.

Questions concerning this commitment may be directed to Chip Lagdon at (301) 903-4218 or me at (301) 903-8008.

Sincerely,

A handwritten signature in black ink, appearing to read "Frank B. Russo".

Frank B. Russo  
Deputy Assistant Secretary  
Office of Corporate Performance Assessment

Attachment

cc: Beverly A. Cook, EH-1  
Mark B. Whitaker, DR-1  
Chip Lagdon, EH-31

**Defense Nuclear Facilities Safety Board Recommendation 2002-1  
Software Quality Assurance Improvement Plan  
Commitment 4.3.3**

**Establish Relationships and Collaborate with Outside  
Organizations**



Prepared by  
U.S. Department of Energy  
Office of Environment, Safety and Health

December 2003

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# **DNFSB Recommendation 2002-1**

## **Implementation Plan Commitment 4.4.3 Report**

### **Overview**

The Department's Implementation Plan Commitment 4.4.3 for DNFSB Recommendation 2002-1, *Quality Assurance for Safety Software at Department of Energy Defense Nuclear Facilities* states that the Department will:

“Establish relationships and actively participate with outside groups, organizations, companies, and agencies that have an interest in SQA that is similar to that being addressed by this Implementation Plan. This participation will assist the Department in benchmarking, research and development, and sharing of lessons learned and new technologies.”

The Task Elements associated with this commitment included:

1. Identify DOE, contractor and industry groups with SQA interest
2. Establish liaisons with interested groups to establish points of contact
3. Attend next scheduled meeting with these groups
4. Establish Knowledge Management Community of Practice
5. Write report that describes relationships with outside groups, including points of contact.

This report documents the completion of Commitment 4.4.3 and summarizes ongoing activities resulting from commitment actions.

### **Background**

To ensure continuous improvement in the area of Software Quality Assurance (SQA), the Department of Energy (DOE) must stay current with industry and Federal agency standards and practices related to SQA. To accomplish this a formal coordinated effort will be taken to interface with other agencies, industries and organizations with expertise in SQA. It should be noted that various organizations across the Department are undertaking significant SQA efforts, but these efforts are not always coordinated or shared.

The software industry and software technology continue to grow and evolve, and there is much the Department can learn. Several industry and Federal agencies have a related interest in software issues and possess knowledge and expertise that can potentially benefit the Department. The Department will identify and establish relationships with outside groups, organizations, companies and agencies that have an interest in SQA that are similar. The Department will actively participate with these groups and use these relationships to assist with benchmarking and sharing lessons learned and new technologies.

This report summarizes the relationships established to date. These relationships will evolve as a natural course of DOE's business activities and as more is learned about the benefits of the relationships to the Department. The type of involvements discussed in this report assumes the existence of sufficient support resources, and the exact nature of the involvements with the SQA related groups could vary over time based on the groups' respective activities.

## **Actions Summary**

In response to Task Elements 1, 2 & 3 the Office of Environment, Safety and Health (EH) researched industry and standards organizations and polled selected DOE and contractor SQA subject matter experts (SME) to identify a list of outside groups, organizations, companies, agencies and external SQA experts. The initial listing compiled included:

- American Nuclear Society (ANS) 10.4 Working Group
- American Society of Mechanical Engineers (ASME) Committee on Nuclear Quality Assurance
- American Society for Quality (ASQ) Software Division
- American Society for Quality (ASQ) Z-1 Committee
- Energy Facility Contractors Group (EFCOG) Quality Assurance Subgroup and QA Topical Committee
- Electric Power Research Institute (EPRI)
- Health and Safety Executive, United Kingdom
- International Atomic Energy Agency (IAEA) Nuclear Safety Policy
- International Electrotechnical Commission (IEC) Subcommittee 65A (System Aspects)
- Institute of Electrical and Electronics Engineers (IEEE) Software Engineering Standards Committee (SESC)
- Instrumentation, Systems, and Automation Society (ISA)
- International Standards Organization (ISO) Joint Technical Committee 1 Subcommittee 7 (Software and Systems Engineering)
- US Technical Advisory Group (TAG) for the International Standards Organization (ISO) Technical Committee 176 (Quality Management and Quality Assurance)
- Massachusetts Institute of Technology (MIT) Software/System Engineering Research Lab (SERL)
- Carnegie Mellon University Software Engineering Institute (SEI)
- Nuclear Weapons Complex (NWC) Software Quality Assurance Subcommittee (SQAS)
- University of York High Integrity Systems Engineering (HISE)
- Systems Safety Society

The charters, activities and relationships of the identified organizations were examined through investigations and interviews. Organizations with charters and activities most directly related to the Department's SQA initiative were identified and agreements have

been or will be established for formal DOE participation with the following relevant organizations/committees:

- **ANS 10.4 Working Group:** Chip Lagdon, DOE – Membership in ANS established December 2003 with request for participation in working group to follow. Expected participation will include attendance at annual meetings and periodic teleconferences as well as associated authoring and reviewing work products.
- **US TAG ISO TC 176 and ASQ Z-1:** Bud Danielson, DOE – Participation includes 2 US meetings/year, 1 international meeting, various teleconferences throughout the year as well as associated authoring and reviewing work products.
- **ASME Committee on Nuclear Quality Assurance:** Bud Danielson, DOE – Past and future participation includes participation on 4 committees (NQA-1, NQA-1 Executive Committee, Applications Subcommittee Chair, and Task Project Lead). Participation requires attendance at a minimum of 2 meetings/year and semi-monthly teleconferences as well as authoring and reviewing work products associated with NQA-1. DOE HQ and DOE contractor staff (e.g., Sandia National Laboratory, Pacific Northwest National Laboratory, Yucca Mountain Project, Los Alamos National Laboratory, and Idaho National Engineering and Environmental Laboratory) participate in task items to produce guidance documents related to NQA-1 and other standards such as QC-1, 10CFR71 and 10CFR72.
- **EFCOG QA Subgroup and QA Topical Committee:** Chip Lagdon, DOE and Bud Danielson, DOE – Established sponsorship of QA subgroup in October 2003 and focused subgroup on QA issues. Attended November 2003 meeting. Expected participation includes attendance at 2 meetings/year with periodic teleconferences as well as authoring and reviewing work products.
- **IAEA Nuclear Safety Policy:** Bud Danielson, DOE – Develop and review nuclear safety policy codes and standards. Past and future participation includes 2-3 meetings/year as well as authoring and numerous reviews of work products.
- **IEEE SESC:** Debra Sparkman, DOE/LLNL – Established a liaison between DOE and IEEE software engineering standards December 2003. Assigned personnel as a formal DOE liaison similar to the well-established liaisons between IEEE SESC and SEI and the Department of Defense. Participation requires attendance at 2 meetings/year and monthly teleconferences.
- **NWC SQAS:** Chip Lagdon, DOE and Debra Sparkman, DOE/LLNL – Established relationship and joined SQAS September 2003. Attended September 2003 semi-annual meeting. Recruited several SQAS members for DOE SME panel on SQA. Participation requires attendance at 2 meetings/year as well as authoring and reviewing work products.
- **University of York HISE:** Chip Lagdon, DOE – October 2003 joined moderated discussion group on software safety topics. Participation requires

periodic interaction with discussion group members and sharing of information within DOE and the DOE SQA Community of Practice.

In response to Task Element 4, preliminary actions included:

- Identified DOE, contractor and external SQA SME's and interested parties and established a List Server to communicate relevant SQA and Implementation Plan actions and information.
- Consolidated the internal and external SQA SME's and interested parties into a DOE SQA Community of Practice (COP). This COP will serve as the focal point for collaboration in developing SQA products and sharing important information related to SQA. COP collaboration will be facilitated through an SQA Knowledge Page being developed by EH. Diagram 1 illustrates the conceptual interaction of people, processes, and technology-facilitated information.

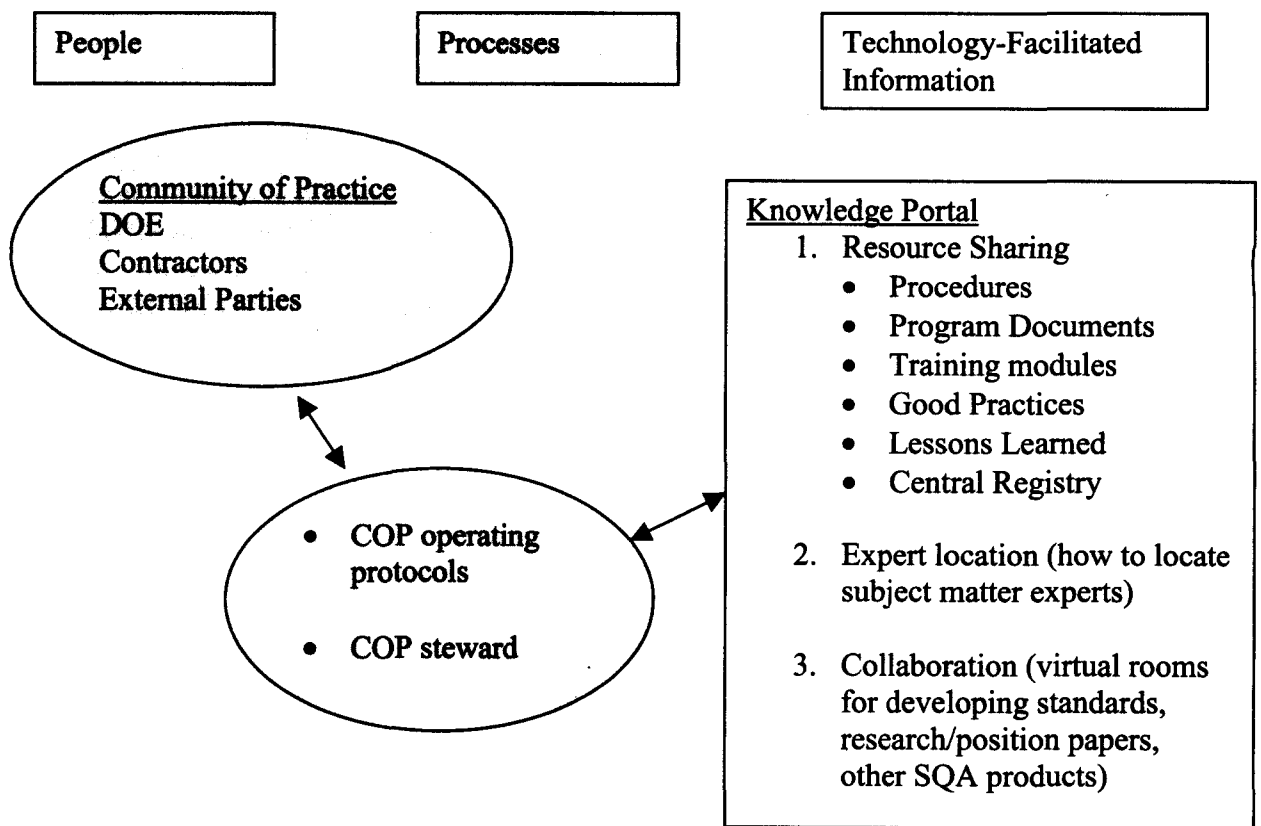


Diagram 1: SQA Community of Practice Conceptual Interactions

## **Ongoing Activities**

The actions to date have established agreements and mechanisms that fulfill Commitment 4.4.3 of the Implementation Plan. A number of ongoing activities will serve to institutionalize the intent of this Commitment. These activities are necessarily dynamic and will evolve over time as the DOE relationships with various internal and external groups mature and as the membership and functions of the Community of Practice progress. The activities underway and planned during the 2004 fiscal year are as follows:

- Participation in SQA professional and standards organizations: DOE and contractor personnel will participate in SQA professional and standards organizations consistent with the participation procedures of the respective organizations. In some cases DOE and contractor personnel will attend regular meetings of such organizations serving as organization/committee members and presenting papers as appropriate. In other cases, participation may take the form of conference calls or videoconferences. In some cases, participation may take the form of collaboration in document preparation or reviews. The specific level and nature of participation will be determined by a combination of factors including the significance of a given activity to the Department, budgets, coordination of DOE/contractor participation and emergent issues and continuous improvement.
- The SQA Community of Practice Knowledge Page will be developed and initiated by late February 2004. The Knowledge Page will include an expert location feature, repositories for procedures, training material, program descriptions, good practices and lessons learned. The Knowledge Page will also provide capabilities for member collaboration in product development and threaded discussions. Diagram 1 illustrates the COP and Knowledge Page facilitated interactions.