TV/DOE STW QA WS 2/4-7/91 FEB 22 1991

MEMORANDUM FOR: Kenneth R. Hooks, Section Leader
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Repository Licensing and Quality Assurance
Project Directorate
Division of High-Level Waste Management

FROM: Tilak R. Verma
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SUBJECT: DOE SOFTWARE QA WORKSHOP, FEBRUARY 4-7, 1991

On February 4-7, 1991, I attended the U.S. Department of Energy (DOE) Quality Assurance (QA) Workshop held at the Howard Johnson Plaza Hotel, in Las Vegas, Nevada. The purpose of the workshop was to develop recommendations for resolving issues identified during a DOE Software QA Workshop held January 22-23, 1991, (see J. T. Buckley's memo dated February 4, 1991) and for improving software QA for the Yucca Mountain Project (YMP) work.

The workshop participants included software users, principal investigators, QA managers and Technical Project Officers (TPOs) from DOE, LANL, LLNL, MACTEC, REECo, RSN, SAIC, SNL and USGS. Observers were present from the NRC, EEI and EG&G. The workshop participants and observers were divided into three work groups and were asked to discuss and document the root causes, solutions and recommendations for resolving the three major issues identified during the January 22-23, 1991, DOE Software QA Workshop and for improving the SQA program for the YMP work. These major issues were:

a. The current SQA requirements are ambiguous, lack a basis for need, and are poorly understood.

b. SQA requirements must include a software classification scheme based on the nature, importance and intended application and must be commensurate with impact on quality.

c. Requirements focus on documentation of all phases/cycles of software development, not on testing/validation. Emphasis is needed on the quality of software required for licensing and not paper trail.

Each work group was assigned one of the three major issues and was provided with the data that were collected during the previous week for use by these work groups for resolving the major software QA issues. I participated in Work Group C discussions on identification of root cause and development of solutions and recommendations for improving the software QA in the YMP work.

The workshop participants generated several recommendations and presented them to the DOE management for consideration. These recommendations include:

- Establishment of a Standing Software QA Working Group;
- Identification of Optimum SQA requirements for licensing;
- Some SQA requirements' training is needed for auditors and the participant point of contacts; and
- Review and identification of existing QARD flexibility for discussions and adaptations by the participants. A working group meeting of the DOE/YMP participants is planned for action on this recommendation. This meeting will be held in Las Vegas, Nevada on March 8, 1991.

The subject workshop was very useful and effective in identifying the major SQA issues and in developing recommendations for resolving three issues, and for improving SQA program. Viewgraphs developed by the workshop participants/ facilitators for presentations to the DOE management are attached.

ORIGINAL SIGNED BY

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Attachments: As stated

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QA SOFTWARE

WORKSHOP

PRESENTATION

TO

PROJECT MANAGEMENT

LAS VEGAS, NEVADA

FEBRUARY 7, 1991

AGENDA-DOE/PARTICIPANT QA SOFTWARE WORKSHOP

INTRODUCTION (L. Hayes/D. Helton)

- o Introductions
- o Agenda Discussion
- o Workshop Credo
- o Process
  Problem statement

GROUP REPRESENTATIONS (J. Stuckless/K. Schwartztrauber)

- o The Problem (need)
- o Integrated Solution
- o Additional (short-term) Solutions

CLOSING (All)

- o Summary (All)
- o Questions
- o Decisions

DOE SOFTWARE QUALITY ASSURANCE WORKSHOPS

LAS VEGAS

JANUARY 22-23 AND FEBRUARY 4-7, 1991

TO IDENTIFY SPECIFIC ISSUES ASSOCIATED WITH THE SOFTWARE QA PROGRAM, AND TO DEVELOP RECOMMENDATIONS FOR IMPROVING THE SOFTWARE QA PROGRAM

(WORKSHOP CHARTER)

<u>PARTICIPANTS</u>

SCIENTISTS/ENGINEERS

QA STAFF

DATA AND INFORMATION ADMINISTRATOR

DOE

LANL	MACTEC
LLNL	REECO
SNL	RSN
USGS	SAIC

<u>OBSERVERS</u>

NRC
EEI
EG&G

SOFTWARE QA ISSUES IDENTIFIED AT THE DENVER WORKSHOP

August 7, 1990

1. Software QA control applied too early.

2. Software QA control specified in inappropriately excessive detail.

3. Work acceptable to one participant may not be acceptable to another.

4. QA 88-9 (QARD Section 19) requirements focus on documenting all phases/ cycles of development, not (as it should) on testing/validating software that will be used.

5. Labor intensive documentation greatly impedes scientists from keeping abreast of state-of-the-art techniques of products.

6. Documentation centers on development cycle without regard to determination of acceptability prior to use or change/configuration controls once software is operational.

7. Present trail (myriad) from QAP-88-9/QARD to USGS QAPP, Software QA Plan, to QMP is too complex to allow reasonable implementation.

8. The present process contains too many unnecessary layers of requirements documents.

QA SOFTWARE WORKSHOP CREDO

"Establish an interactive and dynamic process among Scientists/Engineers regulators, QA staff, and managers to develop requirements and then implementing procedures, with emphasis on understanding, need, and end use; then let the Program have a chance to work"

WORKSHOP PROCESS:

Las Vegas Meeting

- Initial input & open discussion of problems relating to QA software implementation

- Address & clarify the problems

- Problems impact on ability to do needed technical/scientific work effectively

(Close interaction between Technical staff, management, and QA throughout entire process)

- Group Consensus Building

PROBLEM STATEMENT

Poor identification and definition of valid requirements has led to a pervasive lack of common understanding of SQA requirements and their need and application among NRC, DOE and participants. (What are the requirements? Why are they needed? To whom do they apply? When are they required?)

GOAL STATEMENT

DOE and participants identify a common set of precisely defined SQA requirements that will:

1. Produce deliverables that will withstand the rigors of the licensing process.

2. Be acceptable to the users by allowing flexibility and avoiding unnecessary controls.

SUMMARY

- Obtain Acceptance by DOE Management
- Focus on Short-Term Improvements
- Establish a Software Working Group
- Identify and Define Requirements
- Process will remain interactive with all Participants
- Implement a QA Software Program that meets requirements--Regulatory and Technical

ACTION------ACTION------ACTION

As an indication of the effectiveness of the problem-solving process we used, I'd like to give you a brief scorecard as follows:

- There were 82 specific software quality-related concerns identified by the workshop team members

- As a result of solving the 3 most important problems, 69 of the 82 problems were also addressed

- A number of the 13 remaining concerns were implicitly covered during the process of addressing the 3 major problems

All of the 13 concerns will be tracked as part of the follow-on process.

SHORT TERM AND SPIN-OFF ISSUES

SHORT-TERM

- EXISTING QARD FLEXIBILITY
- PRELIMINARY DATA COLLECTION FOR SOFTWARE WORKING GROUP

SPIN-OFF ISSUES

- MOCK LICENSING PROCESS (PHASE 2 WORKSHOP COMMITTEE)
- QA GRADING
  - GRADING REVISION BY BLANCHARD, HORTON, ET. AL.

EXISTING QARD FLEXIBILITY

RECOMMENDATION:

IDENTIFY AND CLARIFY EXISTING FLEXIBILITY IN SECTION 19 OF QARD. (EG: NATURE, COMPLEXITY, AND IMPORTANCE)

ACTION:

1. PARTICIPANTS* COMMUNICATE IMPLEMENTATION CONCERNS TO PROJECT OFFICE QA

2. QA* SPONSOR MEETING(S) WITH PARTICIPANTS* TO DEVISE SOLUTIONS TO IMPLEMENTATION ISSUES

*REPRESENTATIVES FROM THIS WORKSHOP

PRELIMINARY DATA COLLECTION

RECOMMENDATION:

IDENTIFY AND GATHER PREVIOUSLY PERFORMED ANALYSES OF STANDARDS/ REQUIREMENTS FOR SOFTWARE QA AND MAKE AVAILABLE TO SOFTWARE WORKING GROUP

ACTIONS:

AL WILLIAMS OF THE PROJECT OFFICE WILL BE THE POINT-OF-CONTACT FOR DISSEMINATION OF INFORMATION

MOCK LICENSING PROCESS

RECOMMENDATION:

INCLUDE SOFTWARE IN THE MOCK LICENSING PROCESS RECOMMENDED IN THE PHASE 2 QA WORKSHOP

ACTION:

SOFTWARE WORKSHOP PARTICIPANTS* WILL CONTACT PHASE 2 QA WORKSHOP PARTICIPANTS** TO REQUEST THAT PROJECT RELATED SOFTWARE ACTIVITIES ARE REPRESENTED IN THE MOCK LICENSING PROCESS

* J. BLINK & T. CHANEY

** A. JARDINE

QA GRADING

RECOMMENDATION:

USE GRADING PROCESS TO ACHIEVE FLEXIBILITY IN APPLICATION OF SOFTWARE QA CONTROLS. GRADING SHOULD BE AT A LEVEL OF DETAIL TO DISTINGUISH AMONG DIFFERENT SOFTWARE USES

ACTION:

ONCE THE PROJECT GRADING PROCESS IS REVISED THE DEFINED SOFTWARE CATEGORIES CAN BE USED TO GUIDE THE SELECTION OF CONTROLS TO BE APPLIED TO SOFTWARE

I MAY NOT HAVE THE ANSWER TO ALL YOUR PROBLEMS. IN FACT I MAY RAISE MORE QUESTIONS THAN I ANSWER. BUT REST ASSURED, IF YOU ARE STILL CONFUSED WHEN I AM FINISHED, IT WILL BE ON A HIGHER PLANE AND ABOUT MORE IMPORTANT ISSUES.

PROBLEM STATEMENTS

1. THE CURRENT REQUIREMENTS ARE AMBIGUOUS, LACK A BASIS FOR NEED, AND ARE POORLY UNDERSTOOD

2. SOFTWARE QA REQUIREMENTS MUST INCLUDE A SOFTWARE CLASSIFICATION SCHEME BASED ON THE NATURE, IMPORTANCE AND INTENDED APPLICATION AND MUST BE COMMENSURATE WITH IMPACT ON QUALITY

3. REQUIREMENTS FOCUS ON DOCUMENTATION OF ALL PHASES/CYCLES OF SOFTWARE DEVELOPMENT , NOT ON TESTING/VALIDATION. EMPHASIS NEEDED ON THE QUALITY OF SOFTWARE REQUIRED FOR LICENSING AND NOT PAPER TRAIL

ESTABLISH A STANDING SOFTWARE WORKING GROUP

DEVELOP A CHARTER

- REVIEW AND RECOMMEND REVISIONS TO THE SOFTWARE PROGRAM
- MEMBERSHIP MUST REPRESENT THE BROAD SCOPE OF THE PROJECT AND INCLUDE SPECIALTIES SUCH AS SQA, SOFTWARE DEVELOPERS AND TECHNICAL PERSONNEL
- MEMBERSHIP LIMITED TO 10
- EVALUATE NEED FOR SQA MANAGER
- PROVIDE LONG-TERM FOCUS FOR RESOLUTION OF SOFTWARE ISSUES, AND INTERPRETATION OF REQUIREMENTS

THE WORKING GROUP WILL IDENTIFY THE OPTIMUM SQA REQUIREMENTS FOR LICENSING

- PRESENTATION OF SQA WORKSHOP GROUP RESULTS
- EXAMINE CURRENT REGULATIONS, DOE ORDERS, INDUSTRY STANDARDS, NRC GUIDANCE.
- EMPHASIZE ACCEPTED SCIENTIFIC PRACTICES
- CONSULT WITH OUTSIDE EXPERTS INCLUDING THE NRC
- DEVELOP DEFINITIONS AND SOFTWARE CLASSIFICATIONS
- USE SOFTWARE CLASSIFICATIONS TO PROVIDE FLEXIBILITY IN THE APPLICATION OF SQA CONTROLS
- DOCUMENT RATIONALE FOR MODIFICATIONS TO EXISTING SQA PROGRAM

PARTICIPANT REVIEW

- PARTICIPANT REVIEW OF PROPOSED SQA PROGRAM

PRESENT PROGRAM TO DOE/NRC

- DOE FIRST
- NRC

SQA TRAINING

- AUDITORS AND PARTICIPANTS POINT OF CONTACT MUST RECEIVE SAME SQA REQUIREMENTS TRAINING