

DOE SOFTWARE QA WORKSHOP

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FEB 04 1991

MEMORANDUM FOR: Ken Hooks, Section Leader
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SUBJECT: DOE SOFTWARE QA WORKSHOP, JANUARY 22-23, 1991

On January 22-23, 1991, I attended the DOE Software Quality Assurance (QA) Workshop held in Las Vegas, NV at the Howard Johnson Plaza Suites. The purpose of the workshop was to identify software QA issues and develop recommendations for improving software QA.

The workshop participants included software users, QA Managers and TPO's from DOE, LANL, LLNL, REECo, RSN, SAIC, SNL and USGS. Observers were present from the NRC, EEI and EG&G. Interim working papers from the workshop are attached. Page 5 of the attachment provides the workshop agenda for the completed January 22-23, 1991 session and the upcoming February 4-7, 1991 session.

Day one of the workshop consisted of identifying participants expectations of the workshop, evaluating participants individual work styles, developing common software QA (SQA) problem and goal statements, and identifying a comprehensive list of SQA issues. A total of 82 SQA issues were identified by the workshop participants.

A prioritizing process was used, on day two of the workshop, to determine the most important issues to be resolved. Three work groups were formed to address the three top priority issues which were:

- a. Ambiguous requirements which appear to lack a basis for need and are poorly understood.
- b. Requirements focus on documenting all phases/cycles of software development, not on testing/validation.
- c. Software QA requirements must include a software classification scheme based on the nature, importance and intended application, and be commensurate with impact on quality.

9102080208 910204
PDR WASTE
WM-11 PDR

103.7
WM-11
NH16

For each issue, the work groups were asked to answer the following questions:

What	is involved? is wrong?
Who	is generating? is affected?
Where	is it happening?
When	is it happening?
How	serious? costly? painful?

The last activity of the workshop session was to determine what data was needed by each working group to resolve their particular issue. This data is to be collected by workshop participants prior to reconvening on February 4, 1991. As a NRC representative, I was asked to collect the following information:

- Current status of NUREG-0856.
- History and origin of NUREG-0856 and software QA controls applied within the NRR program.

This information will be presented to the group on February 4, 1991.

ORIGINAL SIGNED BY

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Enclosure:
Interim Working Papers

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NAME:JBuckley/vw:KHooks	:	:	:
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INTERIM WORKING PAPERS

DOE SOFTWARE QUALITY ASSURANCE WORKSHOP

LAS VEGAS
JANUARY 22,23, 1991

PURPOSE:

- * Build Cohesive Team
 - * Identify Issues
 - * Develop Recommendations For Improving Software QA

PARTICIPANTS

USERS

QA MANAGERS

TPOs

DOE
LANL
LLNL
REECo
RSN
SAIC
SNL
USGS

OBSERVERS

EG&G
EEI
NRC

TEXT ASCII SCAN

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Many of the "flip chart" notes were the result of brainstorming sessions, and DO NOT REFLECT GROUP CONSENSUS. They are for use as "memory joggers" only, and should not be used by other than workshop participants.

1. INTRODUCTION

DOE Management and Quality Assurance have been listening to the scientific community and have embarked upon a series of workshops designed to bring forth the scientist concerns and provide acceptable solutions.

This report describes the participants, the process and the results of the workshops to date.

2. ISSUE IDENTIFICATION - DENVER - AUGUST 1990

An initial workshop was held in Lakewood, Colorado (Denver) on August 7, 1990. This workshop was an open forum wherein the respective personnel from each participant discussed perceived concerns associated with the implementation of a Quality Assurance Program (10 CFR 50 Appendix B & NQA-1) in the scientific community.

There were four main areas of concern that resulted from that workshop:

- A. Lack of flexibility in the application of the QA Program during scientific research, acceptability of peer review, application of dual research, required restrictive predictions without consideration for unknowns, further definition of requirements, and procedures commensurate with acceptable (good) scientific practices.
- B. **Computer Software QA program (too complex, does not allow freedom to develop conceptual/prototype design/analysis) is based upon obsolete model concepts, not updated to present state-of-the-art, excessive documentation during development, lack of flexibility/lengthy change process, and needs in-depth review.**
- C. Data - its definition, what form, when it is complete and most importantly, time limitation for transfer to the appropriate participants data archive within 45 days of completion of data acquisition or development.

Note: This is not considered a QA problem per se, rather a management (project) problem.

- D. Communications - It was apparent that inter-participant/project communications are limited and need improvement.

3. QUALITY ASSURANCE ISSUES WORKSHOPS - October 1990.

A workshop was held October 10-12 and 25 in Las Vegas, Nevada. The subject was the concern: "Application of the Quality Assurance Program to scientific research." Participants included a Geologist and a QA Consultant from DOE; seven scientists, five QA Managers, and four TPOs from LANL, LLNL, SNL, and USGS; one Quality Consultant from EEI; and two Facilitators from MACTEC. There were two observers from the USNRC. This workshop generated a number of actions which are currently underway.

4. SOFTWARE QUALITY ASSURANCE WORKSHOP - INTRODUCTION

The workshop which is the subject of this document is currently in progress to address the Denver issue:

Computer Software QA program (too complex, does not allow freedom to develop conceptual/prototype design/analysis) is based upon obsolete model concepts, not updated to present state-of-the-art, excessive documentation during development, lack of flexibility/lengthy change process, and needs in-depth review.

Opening comments by Nancy Voltura on the behalf of Don Horton will be included in the final report.

5. WORKSHOP PURPOSE

The purpose of the workshop is:

- * Build Cohesive Team
- * Identify Issues
- * Develop Recommendations For Improving Software QA

Note that this document covers the first two. The third item will be completed in the second half of the workshop. (Feb. 4-7, 1991.)

6. AGENDA

The agenda for the workshop is:

January 22-23

Introduction
Interview Results
Workshop Process
 Agreements
 Work Styles
Develop Problem Statement
Develop Goal Statement
Identify Issues
Prioritize Issues
Plan Data Collection

February 4-7

Introduction
Review Data Collected
Identify Root Cause
Generate Solutions
Evaluate Solutions - Formulate Recommendations
Develop Action Plan
Present to Management

7. EXPECTATIONS OF PARTICIPANTS

Participants stated their Expectations for the workshop:

- * Workable software QA program
- * Simplified approach to commercially acquired software
- * Identify software issues
- * Find solutions acceptable to scientists
- * Go back to look at NRC requirements
- * Listen to issues
- * Better understanding of how to meet requirements
- * Software systems people want to use
- * Workable system to develop software
- * Software supports licensing
- * System that is easier to follow than to avoid
- * Issues keeping us from using current program
- * Level of documentation required

- * Reduction in software QA overkill
- * Identify a few issues -- Identify an action plan to resolve them
- * Layers of documentation
- * Minimize documentation
- * Uniformity as applied to implementation
- * When do we start controlling software
- * Less emphasis on "assurance" and more on quality
- * Flexible, workable program
- * Software programs not needing QA -- identify
- * See more flexible, speedier implementation
- * Common understanding of what requirements permit
- * Define requirements, identify actions needed for flexible program
- * Want to see something agreed upon that meets licensing requirements and participants can implement
- * Want to see simplified project-wide system
- * Hear viewpoints from various perspective and create plan of action for management to implement
- * Simplified program with appropriate controls
- * We understand requirements, so we can support them
- * Work together to create a solution
- * People will be able to implement their programs

8. WORKSHOP ROLES AND RULES

ROLES:

Facilitators: Stimulate
Focus
Capture
Schedule

Participants: Listen
Talk
Give others chance

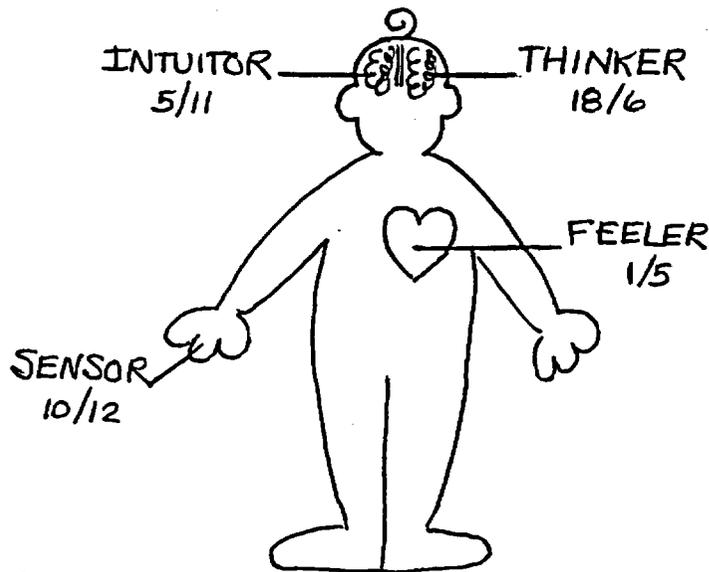
Observers: Listen
Ask - Off line
Empty chair

RULES:

- * Focus on unity
- * Solutions - not blame
- * Idea belongs to group

9. WORK STYLES

Workshop guidelines were developed and participants took an inventory to determine their Individual Work Styles. These were shared and were used throughout the workshop to improve communication.



10. PROBLEM STATEMENT

Participants developed the following 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?)**

11. GOAL STATEMENT

Participants developed the following Goal Statements:

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.**

12. ISSUES IDENTIFICATION AND PRIORITIZATION

Work groups reviewed the eight software QA issues identified in the Denver workshop. An additional 74 items were added for a total of 82 issues. A prioritizing process was used to determine the most important issues to be resolved.

The following is a list of all the issues identified. Voting results and reference numbers for those issues that were duplicates. Bold print indicates the top issues chosen for problem solving.

SOFTWARE QA ISSUES

Issues	Vote No		Reference
	1	2	
1. Software QA control applied too early.	26	16	
2. Software QA control specified in inappropriately excessive detail.	15	0	14
3. Work acceptable to one participant may not be acceptable to another.	8	0	12
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. (Combined with 24, Group B)	23	18	4,5,8,74,78
5. Labor intensive documentation greatly impedes scientists from keeping abreast of state-of-the-art techniques of products.	1	0	49

6. Documentation centers on development cycle without regard to determination of acceptability prior to use or change/configuration controls once software is operational.	12	0	
7. Present trail (myriad) from QAP 88-9 QARD to USGS QAPP Software QA Plan to QMP is too complex to allow reasonable implementation.	0	0	8
8. The present process contains too many unnecessary layers of requirements documents.	26	16	7,13,26,27, 47,57,62, 64
9. There are multiple types of software; therefore, there should be multiple types of controls.	0	0	79
10. Current controls are applied without consideration of cost.	0	0	76
11. An application that takes one-half day to develop should not require one week of effort to meet QA requirements.	0	0	
12. Once software has been verified and validated (qualified) in one participant's process, it should be able to be used in any other participant's program.	0	0	3
13. The control for software come from several conflicting sets of requirements (i.e., NUREG-DOE orders, QARD, CMP, etc.)	0	0	8
14. Some of the detailed requirements should be removed from the QARD.	0	0	2
15. Need to review the level of approval required for implementation of the SQA program.	3	0	
16. People who write the requirements don't understand software.	0	0	17
17. Personnel responsible for establishing and directing QA software programs lack QA software experience and talent.	15	0	16,61
18. Software is only as good as the underlying principles (i.e., validation) that support it which requires a rigorous field experimental program.	0	0	4
19. The participants do not understand the past direction to QA staff.	0	0	
20. Data Acquisition Reduction software should be controlled by the analysis of NIST traceable stand alone.	0	0	79
21. There is a lack of clear mechanism to take exception to upper-tier requirements.	18	0	
22. Separate administrative requirements from QA requirements such that duplicate or overlapping audits are eliminated.	0	0	69

Issues	Vote No		Reference
	1	2	
23. Software lifecycle controls need to be commensurate with the complexity of the application (e.g., controls should not be rigorous for simple applications).	0	0	79
24. Emphasis is needed on the quality of software required for licensing and not paper trail. (Combined with 4, Group B)	21	18	
25. Need to understand the strengths and weaknesses of software QA programs used at commercial nuclear facilities and how they achieve flexibility.	0	0	
26. Minimize redundancy (over prescription) and maximize flexibility.	0	0	
27. Need to evaluate relevancy of NUREG-0 SGS. Is it still current since it is 10 years old?	7	0	
28. More active role by QA to offer advise and assistance and not only judgement.	0	0	
29. Need to have a project-side database containing all qualified software.	9	0	
30. It is unclear when QA controls should be applied to administrative software.	0	0	79
31. Lack of consistent understanding of requirements. (Combined with 79, Group A)	31	24	
32. Need to understand where the requirements come - what is needed?	24	7	
33. What are QA requirements and how can we differentiate between these and others? - Lack of DOE understanding of how software is used. - Lack of implementation experience.)	14	0	
34. No training program exists that explains the requirements that the DOE is promulgating.	7	0	59
35. Need to consider NQA-2, Part 2.7 and NQA-3 when developing SQA requirements.	0	0	32
36. No common terminology.	16	0	
37. Inappropriate subordination of the role of software configuration management.	6	0	
38. Widespread misinformation regarding the SQA requirements.	0	0	
39. Antiquated mechanisms for archiving project QA records.	8	0	
40. Integrated data into the SQA process.	8	0	
41. Identifying hardware as software environment.	8	0	

42. Assess passdown requirements from regulator (NRC to DOE) for need and applicability to work being performed by participants.	0	0	32
43. Less reliance on interpretation of requirements.	0	0	31
44. List of requirements we can not live without.	0	0	32
45. More emphasis on testing and verification.	0	0	4
46. Current program encourages compliance-based auditing and it should promote performance-based auditing.	14	0	
47. List all existing <u>QA</u> requirements documents excluding administrative requirements.	0	0	8
48. Separate in-house developed from purchased software.	0	0	79
49. Flexible for iterative process.	0	0	5
50. Qualifying existing software.	0	0	
51. Control applications of commercial grade software -- not the software.	0	0	79
52. Controls should be commensurate with software complexity and impact on quality. (Group C)	28	23	54,58
53. Over emphasis of process.	6	0	
54. Define/describe where SQA is <u>not</u> required.	0	0	52
55. Poorly defined SQA program.	2	0	31
56. Resistance to change.	0	0	65
57. Too many unnecessary layers of walk-through reviews, general bookkeeping.	0	0	8
58. Apply SQA controls commensurate with critical importance of software.	0	0	52
59. Better training.	0	0	31
60. No commonly defined products.	0	0	70
61. Need greater scientists involvement in this SQA development.	0	0	17
62. SQAP is unnecessary.	0	0	8
63. Develop SW experts regarding QA aspects.	14	0	
64. Too many individual documents are required to implement SW management and SW QA programs.	0	0	
65. No "can't do it."	0	0	56
66. Manage QA SW as a subset of SW management.	5	0	
67. For model-based SW evolution of physical model needs to be separately controlled but linked to the numerical model controlled by SQA.	14	0	
68. Misapplication of a developmental-based lifecycle model to comm. proprietary SW products.	0	0	79
69. QA SW management issues are unnecessarily complicated by being combined with standard SW management issues.	14	0	22
70. No clear deliverables for SW QA products.	8	0	60

71. SW QA controls are inappropriately applied to comm. products.	0	0	79
72. What designates the definition of commercial SW.	0	0	79
73. Violation of any copyright laws.	11	0	
74. Excessive emphasis on lifecycle documentation that adds little to licensability.	0	0	4
75. Software that "runs" -- analytical equipment, accumulates data and provides printouts of results is <u>merely</u> part of an analytical system and <u>does not</u> need to be controlled by rigorous QA requirements (i.e., D856 - may require change to upline document.	0	0	79
76. High expenditure of resources versus results.	13	0	10,11
77. Needs to be a more flexible method for records, storage (i.e., floppy disks versus hard copy).	0	0	39
78. Acceptability of procedures for validity and verification of complex models.	0	0	4
79. Inconsistent definitions of SW categories and controls. (Combined with 31, Group A)	33	25	9,20,23,30 48,50,51, 68,71,72, 75,81
80. Evaluate existing SW QA programs (i.e., NASA, other commercial applications).	10	0	25
81. Appropriate application of SQA requirements to operating systems SW.	0	0	79
82. What do we have to apply formal QA to the development of a potential repository conceptual design?	8	0	

13. GROUP PROBLEM SOLVING

Workshop participants formed three work groups to address the top priority issues which are:

- A. **Ambiguous requirements which appear to lack a basis for need and are poorly understood.**
- B. **Requirements focus of documenting all phases/cycles of software development, not on testing/validation**

Emphasis needed on the quality of software required for licensing and not paper trail.
- C. **Software QA requirements must include a software classification scheme based on the nature, importance and intended application, and be commensurate with impact on quality.**

The problem solving process for the three groups is:

- A. Define Problem
- B. Collect Data
- C. Identify Cause
- D. Generate Solutions
- E. Evaluate Solutions/Formulate Recommendations
- F. Develop Action Plan

**COMPLETE
IN PROGRESS
FEBRUARY
FEBRUARY
FEBRUARY
FEBRUARY**

Details of the process to date follow.

A. DEFINE THE PROBLEM.

Participants used a brainstorming process to answer the following questions in order to expand their understanding of the problem.

What	is involved? is wrong?
Who	is generating? is affected?
Where	is it happening?
When	is it happening?
How	serious? costly? painful?

B. DATA COLLECTION.

Each work group identified additional information needed for problem solving. Members were assigned to collect the data before the workshop reconvenes on February 4, 1991.

The remaining steps will be completed during the second half of the workshop, in February.

14. GROUP "A" RESULTS

Problem: Ambiguous requirements which appear to lack a basis for need and are poorly understood.

14.1 GROUP "A" MEMBERS

Saeed Bonabian	Raytheon
Christine Thompson	Reeco
Terri Quinn	LLNL
Mahmood Mirza	Raytheon
Dennis (Dan) Royer	DOE
Larry Hayes	USGS
John Gilray	NRC
Linda Royh	MACTEC
Elaine Erza	EG&G
Steve Harris	SAIC
Russ Hilsinger	Raytheon
Al Williams	DOE
Les Shephard	SNL
Mono Fox	Reeco

14.2 PROBLEM DEFINITION

What?

1. Lack of understanding of basis of requirements
2. Failure by DOE to implement clear requirements
3. Failure to justify need for requirements
4. No explanation of requirements
5. Ambiguous requirements
6. Conflicting upper-tier documents
7. Inappropriate requirements for high level waste repository
8. Misapplication of code of Federal Regulations (CFR)
9. Lack of training
10. Lack of historical precedence
11. Blind compliance
12. Clear description of software categories and controls
13. Requirements do not reflect current, accepted and proven software engineering methods
14. Lack of the involvement of the parties concerned in the decision-making process
15. Confusion between QC and QA as applied to software
16. Scientists cannot or will not implement "perceived dumb requirements"
17. Lack of guidance when you do not need QA certain software programs
18. Lack of experience in developing and implementing similar programs
19. Lack of getting to specifics on which requirements are the problem
20. Perceived need by management to demonstrate a "functioning" SQA program

21. When does the SQA program interface with the applicable DOE orders?
22. Failure to categorize software programs and products
23. No policy board to interpret requirements

Who?

1. Don't know who is generating the requirements
2. All participants and field workers
3. Is DOE responsible for concerning SQA in the Yucca Mountain project
4. All software users are affected
5. Failure of the users to get the specific problems with the requirements
6. Regulatory and technical management and staff are generating and affected

Where?

1. Washington, D.C.
 - * NRC
 - * DOE
 - * Consultants and contractors
2. Participants' locations
3. "Certain" participants' locations
4. YMP office
5. Subcontractors

When?

1. Present
2. Past
3. Future
4. Development, implementation and operational phases of SQA program
5. At time of permanent design activities for quality affecting items
6. During QA overview programs (audits, surv. etc.)

How?

- * Serious
 - * Costly
 - * Painful
1. Problem is very serious
 2. Complete non-cooperation from scientist (deleted)
 3. Boycott by scientists (deleted)
 4. Insufficient results since inception of project
 5. Success of project directly dependent on YMP resolving SW problem
 6. High cost of developing, improving, implementing and surveilling program
 7. Carrying on the documentation concerning unnecessary controls

8. Approximately 622 man-hours per software package verified and validated
9. Personnel turnover because of inability to complete program resulting in loss capabilities, experience, technical credibility and high costs
10. Estimate of one man-year to bring existing 10,000 line code to SQA program requirements
11. Design cannot be approved without resolution
12. Serious versus non-serious depends on one's viewpoint and resolution of problem
13. Degradation between project office and the participants and between the participants themselves
14. 223 QA requirements for software

14.3 DATA COLLECTION

<u>Data Needed</u>	<u>How Collected</u>	<u>Who Is Responsible</u>
* Listing of SW categories.		J. Harper
* Gather info from existing repository programs (i.e., Swedes, WHIP, SALT, etc.).		D. Hoxie L. Shephard
* SDRA and observation from participant and YMPO audits and surveillances.		A. Williams
* List of existing SQA programs within different industries and reference documents.		L. Roy E. Erza
* Each participant and YMPO will identify <u>specific</u> requirements, issues and concerns they are having difficulty implementing and understanding.		L. Hayes G. Cort E. Erza R. Hilsinger L. Shephard J. Blink J. Harper
* Participants' SQAPs and matrices.		L. Hayes L. Shephard G. Cort J. Blink E. Erza J. Harper R. Hilsinger
* Matrix requirements.		S. Harris

Data Needed

How Collected

Who is Responsible

- | | | |
|--|--|-------------|
| * DOE orders. | | A. Williams |
| * NRC review plan, NQA-1, QARD, NQA-2, NQA-3, YMP, hierarchy documents that address QA software; NUREG-0856, 10CFR60 Subpart G, 10CFR50 Subpart B. | | A. Williams |

15. GROUP 'B' RESULTS

Problem: Requirements focus of documenting all phases/cycles of software development, not on testing/validation.

Emphasis needed on the quality of software required for licensing and not paper trail.

15.1 MEMBERS

Jim Blink	LLNL
Mark Kurzmack	USGS
Bob Dann	LLNL
Tom Chaney	USGS
Steve Bauer	SNL
Jim Johnson	LLNL
Keith Schwarztrauber	DOE/SAIC
John Ashton	SAIC
Nancy Voltura	DOE
Claudia Newbury	DOE

15.2 PROBLEM DEFINITION

What?

1. Too much documentation.
2. Not enough testing (no data).
3. Amount of documentation for lifecycle process is foreign to SW developers.
4. Lack of current emphasis on experimentation (no data).

5. Lifecycle documentation is management of process for DOE not for NRC licensing process. (20)
6. Emphasis on V&V configuration management versus development activities. (see No. 12)
7. Inadequate understanding of role of SW in scientific investigation by management. (1.A)
8. 0856 does not require reviews of SW requirements design or coding (why should YMP?).
9. SW lifecycle does not match development. (5)
10. No definition of end product documentation for different types of SW. (1)
11. Details of testing and verification process must be determined by SW developers. (0)
12. Ultimate proof of SW will be found in V&V not history of development. (0)
13. SW development testing and independent V&V testing are not the same. (0)
14. SQA program overkills administrative/management systems (non-sci. code) emphasis on use of systems. (1)
15. No guidance on identifying importance of SW for licensing.
16. No real need for requirements - documents below QARD.
17. Difficulty of independent review of V&V that is meaningful.
18. QARD is inconsistent and adds requirements to 0856. (2 and 4)

Who is Generating?

- * Management
- * DOE
- * Participants

Who is Affected?

- * SW developers
- * SW users
- * Project
- * Public (\$ \$)

Where Happening?

- * All OCRWM participants that do Q-affecting analyses using SW.

When Happening?

- * NOW

How?

- * Serious problem existed for two years
- * Loss of personnel
- * Impacts licensing
- * Costly due to lack of guidance on SW QA requirement interpretations
- * Overkill = Costly implementation
- * Diminished credibility for design activities (current)
- * Wasted resources with trial and error implementation attempts.

15.3 DATA COLLECTION

<u>Data Needed</u>	<u>How Collected</u>	<u>Who Is Responsible</u>
* Examples of other lifecycles different from QARD.		K. Schwartztrauber J. Blink M. Kurzmack
* Current status of 0856 within NRC.		J. Buckley
* Review NRC SRP for SW.		T. Chaney
* Administrative and management SW within nuclear industry -- is it controlled by SQA?		A. Williams
* List of SQA documents and forms generated at each organization.		T. Chaney J. Blink K. Schwartztrauber S. Bauer G. Cort N. Voltura
* List 0856 documentation.		B. Dann
* Documents produced in organization (dev. opinion).		J. Johnson S. Bauer J. Ashton T. Chaney
* List QARD documentation.		C. Newbury

16. GROUP "C" RESULTS

Problem: Software QA requirements must include a software classification scheme based on the nature, importance and intended application, and be commensurate with impact on quality.

16.1 MEMBERS

John Buckley
Tom Colandrea
John Stuckless
Taber Hersum
Randy Schreiner
Keith Kersch
Dwight Hoxie
Gary Cort
Don Helton
Bill Price

NRC
EEI
USGS
SNL
RSN
SAIC
USGS
LANL
DOE
DOE/MACTEC

16.2 PROBLEM DEFINITION

What?

1. Data acquisition/reduction SW should be controlled by analysis of NIST traceable standards only and not by SQA.
2. Acquired SW documentation requirements are too extensive and inappropriate.
3. Need to define SW classes and apply SQA as appropriate.
4. There are no standards for grouping SW into categories for control.
5. Change control requirements during SW development significantly affect schedule.
6. Commercially acquired SW SQA control requirements are too extensive.
7. Non-quality affecting SW should be subjected to less restrictive controls than quality affecting.
8. Define SQA products and deliverables.
9. There are no processes for tying SW to the data it produces and tracking it across the project.
10. What is considered quality affecting SW and what is not.
11. Requirements def. and design specification requirements are too inflexible and do not conform to the natural way of SW development.
12. Lack of what is required of the part for licensing.
13. The basis for requirements is not visible to part.
14. Lacking a simple approach to the control of straightforward SW.
15. Current SQA requirements do not make adequate use of standard scientific controls.
16. Current program lacks flexibility necessary to evaluate SW on a case-by-case basis.
17. Lifecycle model is applied too rigidly.

Who?

18. Lack of knowledgeable, central driving force to define and direct the SQA program.
19. Technical aspects of the program within the part and the DOE are affected.
20. Who is actually driving these requirements?

When?

- 21. Overkill for conceptual software not applicable to licensing.
- 22. Problem of appropriate controls is serious right now.
- 23. When does the development of SW become quality affecting.

How?

- 24. Serious -- wasted manpower and extensive time doing things that are not required.
- 25. Provisions should be made for upgrading prototype SW to quality affecting status.
- 26. Current program adds significant cost to the development and use of SW.
- 27. Current program inhibits scientific creativity.

Where?

- 28. All analytical facilities that use SW in data acquisition.

16.3 DATA COLLECTION

<u>Data Needed</u>	<u>How Collected</u>	<u>Who Is Responsible</u>
* Examples of data acquisition/reduction SW problems.		J. Stuckless
* Example of acquisition SW problem.		T. Hersum R. Schreiner
* G-1 correspondence of issues to QARD, Section 19.		D. Hoxie
* Example of change control problem.		T. Hersum
* Example of requirements definition and design specification.		M. Kurzmack T. Hersum
* Approved program that addresses all issues of this group.		G. Cort

Data Needed

How Collected

Who Is Responsible

- * General estimates of cost.
- * History and origin of QARD, Section 19.
- * Problems with non-quality affecting SW.

D. Helton
B. Price

D. Hoxle
J. Buckley

K. Kersch

APPENDIX A: SOFTWARE QA WORKSHOP ATTENDEES

January 22-23, 1991

Name	Title	Address	Telephone
<u>DOE</u>			
Carl Gertz (Visitor)			
Joe Caldwell (MACTEC)		101 Convention Center Dr. Suite 1100 Las Vegas, NV 89109	(702) 794-7838
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Vince Iorii			
Claudia Newbury			FTS 544-7942
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Keith Schwartztrauber			(702) 794-7230
Nancy Voltura		Las Vegas, NV	FTS 544-7972
Al Williams			FTS 544-7591
<u>EEI</u>			
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<u>EG&G</u>			
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Jeff Logen			

Name	Title	Address	Telephone
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Les Jardine			
James Johnson			(415) 423-7352
Teresa Quinn			(415) 423-2385
<u>NRC</u>			
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<u>RSN</u>			
Saeed Bonabian			
Russ Hilsinger			() 794-7511
Mahmood Mirza			
Randy Schriener			FTS 544-7071

<u>Name</u>	<u>Title</u>	<u>Address</u>	<u>Telephone</u>
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John Ashton			(702) 794-7882
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<u>SNL</u>			
Stephen Bauer			FTS 846-9645
Larry Costin			
Taber Hersum			(505) 846-0893
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<u>USGS</u>			
Tom Chaney			
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