DOE QUALITY ASSURANCE SOFTWARE WORKSHOPS

• SUMMARY OF RESULTS AND RECOMMENDATIONS •

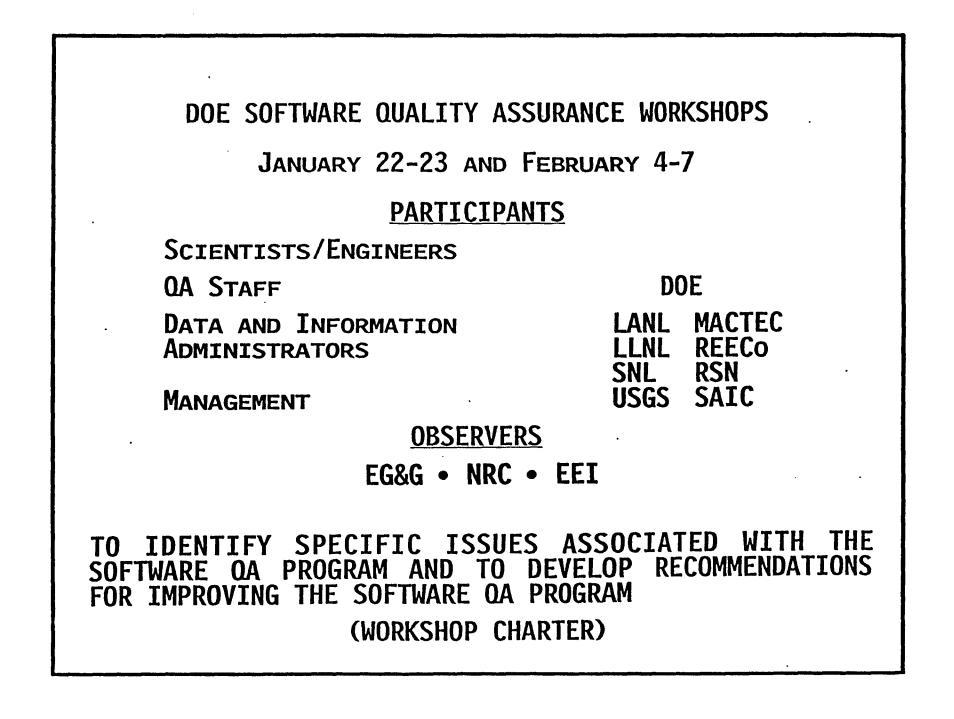PRESENTATION TO THE NUCLEAR WASTE TECHNICAL REVIEW BOARD

BY

SOFTWARE QA WORKSHOP TEAM

PRESENTER: L. E. SHEPHARD
             PERFORMANCE ASSESSMENT
             DEVELOPMENT DIVISION
             SANDIA NATIONAL LABORATORIES

MARCH 27, 1991

DOE SOFTWARE QUALITY ASSURANCE WORKSHOPS

JANUARY 22-23 AND FEBRUARY 4-7

PARTICIPANTS

SCIENTISTS/ENGINEERS

QA STAFF   DOE

DATA AND INFORMATION   LANL   MACTEC
ADMINISTRATORS   LLNL   REECo
                                  SNL   RSN
MANAGEMENT   USGS   SAIC

OBSERVERS

EG&G • NRC • EEI

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

(WORKSHOP CHARTER)

SOFTWARE QA WORKSHOP PROCESS

- **FACILITATED MEETING**
  GROUP CONCENSUS BUILDING

  FORMAL PROBLEM SOLVING

- **CURRENT STATE**
  STATEMENT OF PROBLEM

- **DESIRED STATE**
  STATEMENT OF GOALS

- **PROBLEM SOLVING PROCESS**
  FIND SOLUTIONS TO SPECIFIC PROBLEMS

- **TRANSITION PLAN**
  SET STRATEGY FOR REMAINING PROBLEMS

- **INTEGRATION**
  COMBINE PROBLEM SOLUTIONS

- **ACTION RECOMMENDATIONS**

EMPHASIS ON POSITIVE APPROACH, OPEN COMMUNICATION,

CONSTRUCTIVE DISCUSSION, RESULTS

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:

- PRODUCE DELIVERABLES THAT WILL WITHSTAND THE RIGORS OF THE LICENSING PROCESS.

- BE ACCEPTABLE TO THE USERS BY ALLOWING FLEXIBILITY AND AVOIDING UNNECESSARY CONTROLS.

SOFTWARE QA WORKSHOP PROCESS

- **FACILITATED MEETING**
  GROUP CONCENSUS BUILDING

  FORMAL PROBLEM SOLVING

- **CURRENT STATE**
  STATEMENT OF PROBLEM

- **DESIRED STATE**
  STATEMENT OF GOALS

- **PROBLEM SOLVING PROCESS**
  FIND SOLUTIONS TO SPECIFIC PROBLEMS

- **TRANSITION PLAN**
  SET STRATEGY FOR REMAINING PROBLEMS

- **INTEGRATION**
  COMBINE PROBLEM SOLUTIONS

- **ACTION RECOMMENDATIONS**

EMPHASIS ON POSITIVE APPROACH, OPEN COMMUNICATION,

CONSTRUCTIVE DISCUSSION, RESULTS

RESULTS OF PROBLEM SOLVING PROCESS

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 CONCERNS WERE 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.

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"

PROBLEM STATEMENTS

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

- 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.

- 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.

MAJOR RECOMMENDATION

ESTABLISH A STANDING SOFTWARE ADVISORY GROUP TO IDENTIFY THE OPTIMUM SOFTWARE QA REQUIREMENTS FOR LICENSING:

- EXAMINE CURRENT REGULATIONS, DOE ORDERS, INDUSTRY STANDARDS, NRC GUIDANCE, ETC.

- CONSULT WITH OUTSIDE EXPERTS

- EMPHASIZE ACCEPTED SCIENTIFIC PRACTICES

- STANDARDIZE DEFINITIONS AND SOFTWARE CLASSIFICATIONS

- USE SOFTWARE CLASSIFICATIONS TO PROVIDE FLEXIBILITY IN THE APPLICATION OF SOFTWARE QA CONTROLS

- PROVIDE LONG-TERM FOCUS ON INTERPRETATION OF REQUIREMENTS AND RESOLUTION OF SOFTWARE ISSUES

SHORT-TERM RECOMMENDATIONS
AND RELATED ISSUES

SHORT-TERM RECOMMENDATIONS

- EVALUATE SECTION 19 OF QARD TO CLARIFY REQUIREMENTS AND IDENTIFY SPECIFIC CONCERNS FOR RESOLUTION

- INITIATE COLLECTION OF INFORMATION FOR SOFTWARE ADVISORY GROUP

RELATED ISSUES

- INCORPORATE SOFTWARE QA INTO LICENSING WORKSHOPS

- GRADING PROCESS BEING REVISED BY PROJECT QA
  - APPLICATION OF QA GRADING CONTROLS SPECIFIC TO SOFTWARE USE

ACTION PLAN PROGRESS

- WRITTEN REQUEST TO INCLUDE SOFTWARE AS PART OF PLANNING FOR LICENSING WORKSHOPS (FEBRUARY 11, 1991)

- DRAFT CHARTER FOR SOFTWARE ADVISORY GROUP COMPLETED (MARCH 1, 1991)

- SOFTWARE ADVISORY GROUP TO MEET MARCH 28, 1991

- COMPLETE COMPILATION OF REFERENCE INFORMATION (E.G. INDUSTRY PRACTICES, SQAPs, ETC.) TO SUPPORT SOFTWARE ADVISORY GROUP (EXPECTED MARCH 28, 1991)

- WORKSHOP ON GRADING PROCESS TO INCLUDE SOFTWARE WORKSHOP PARTICIPANTS (APRIL 2-3, 1991)

- COMPLETE EVALUATION OF PROPOSED CHANGES TO PARTICIPANT SOFTWARE PLANS/PROCEDURES RESULTING FROM WORKSHOP (EXPECTED APRIL 4, 1991)

SUMMARY OF

SOFTWARE QA WORKSHOPS

- Synergistic environment
- Focus on short-term improvements
- Establish a Software Advisory Group
- Identify and define optimum requirements
- Process will remain interactive with all Participants
- Implement a Software QA Program that meets Requirements--Regulatory and Technical