



Department of Energy

Washington, DC 20585

QA: L

APR 08 1998

D. R. Wilkins, Technical Project Officer  
for Yucca Mountain Site  
Characterization Project  
TRW Environmental Safety Systems, Inc.  
1180 Town Center Drive, M/S 423  
Las Vegas, NV 89134

ISSUANCE OF DEFICIENCY REPORT (DR) LLNL-98-D-065 RESULTING FROM OFFICE  
OF QUALITY ASSURANCE (OQA) SURVEILLANCE LLNL-SR-98-022

Enclosed is DR LLNL-98-D-065 generated as a result of OQA Surveillance  
LLNL-SR-98-022.

Please identify the corrective action to be taken and implemented to correct the deficiency. Send  
the original of your response to Deborah G. Sult, OQA/QATSS, P.O. Box 30307, Mail Stop 455,  
North Las Vegas, NV 89036-0307. Response to the DR is due 20 working days from the date of  
this letter. Any extension to the due date must be requested in writing, with appropriate  
justification, prior to the due date.

If you have any questions, please contact either James Blaylock at (702) 794-1420 or John F.  
Pelletier at (510) 423-6863.

*R. W. Cel*  
Donald G. Horton, Director  
Office of Quality Assurance

OQA:JB-1372

Enclosure:  
DR LLNL-98-D-065

- cc w/encl:
- T. A. Wood, DOE/HQ (RW-55) FORS
- S. L. Wastler, NRC, Rockville, MD
- S. W. Zimmerman, NWPO, Carson City, NV
- B. R. Justice, M&O, Las Vegas, NV
- R. A. Morgan, M&O, Las Vegas, NV
- W. L. Clarke, M&O/LLNL, Livermore, CA
- R. E. Monks, M&O/LLNL, Livermore, CA
- J. M. Ziemba, OQA/LBNL, Berkeley, CA
- J. F. Pelletier, OQA/LLNL, Livermore, CA

- cc w/o encl:
- W. L. Belke, NRC, Las Vegas, NV
- D. G. Sult, OQA/QATSS, Las Vegas, NV 040016
- R. W. Clark, DOE/OQA, NV

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RADIOACTIVE WASTE MANAGEMENT  
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8  Performance Report  
 Deficiency Report  
NO. LLNL-98-D-065  
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PERFORMANCE/DEFICIENCY REPORT

1 Controlling Document: <b>LLNL 033-YMP-QP-3.2 Software QA</b>	2 Related Report No. LLNL-SR-98-022
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3 Responsible Organization: Lawrence Livermore National Laboratory (LLNL)	4 Discussed With: L. Lewis, J. Blink, D. Wilder, M. Fernandez, R. Monks,
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5 Requirement/Measurement Criteria:  
Quality Assurance Requirements and Description Document (QARD), Revision 7, Supplement I "Software"  
LLNL-033-YMP-QP-3.2 "Software Quality Assurance"  
See Page 3 & 4

6 Description of Condition:  
LLNL 033-YMP-QP-3.2 "Software Quality Assurance" does not meet QARD, Revision 7 requirements. Specific violated requirements include:  
See Page 3 & 4  
Nonisothermal Unsaturated-saturated Flow and Transport (NUFT) code documentation does not meet the requirements of LLNL QP-3.2 nor the imposed requirements of the NUFT Individual Software Plan. Specific violated requirements include:  
See Page 3 & 4

7 Initiator <i>R. Stone for</i> J. Pelletier/Jim Ziembra Date <u>3/18/98</u>	9 Is condition an isolated occurrence? <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Unknown; Must be Yes if PR
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10 Recommended Action: (Not required for PR)

A. Revise current QP 3.2 to meet current QARD, Revision 7, requirements.  
B. Investigate other products and documents developed using this Quality Procedure (QP) to determine any impacts.  
C. Update any software code documentation found deficient in item 6 in the investigative actions of B.  
D. Complete or collect and transmit the missing qualification documentation for NUFT.  
E. Revise the Software QP to make it easier to follow and develop a checklist of all elements and documents required to qualify a software code.

11 QA Review: <i>R. Stone for</i> QAR John Pelletier Date <u>3/19/98</u>	12 Response Due Date 20 working days from issuance
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13 Director, OQA Issuance Approval: (QAR for PR) Printed Name <i>Donald G. Horton</i> Signature <i>R.W. Cap for</i> Date <u>4/1/98</u>
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22 Corrective Action Verified QAR Date	23 Closure Approved by: (N/A for PR) DOQA
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PERFORMANCE/DEFICIENCY REPORT RESPONSE

14 Remedial Actions:

15 Extent of Condition: (Not required for PR)

16 Root Cause Determination: (Not required for PR)

Required  Yes  No

17 Action to Preclude Recurrence: (Not required for PR)

Required  Yes  No

18 Corrective Action Completion Due Date:

19 Response by:

20 Response Accepted

QAR

Date

21 Response Accepted (N/A for PR):

DOQA

Date

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PR/DR CONTINUATION PAGE

**Block 5 - Requirement/Measurement Criteria**

**Block 6 -Description of Condition**

<p>1. QARD Revision 7, Supplement I, "Software" I.1 states "This supplement establishes requirements for the development, modification, control, and use of software".</p>	<p>1. Contrary to this requirement QP 3.2 contains incorrect references to the current QARD and refers to placing requirements on Scientific and Engineering Software and not on all software used for quality affecting work.</p>
<p>2. QARD Section I.2.1.B.2 states "Perform validation ... using test cases developed independently of the software developer. Additional test cases... may be used.</p>	<p>2. Contrary to this requirement development of test cases independently of the developer is not addressed. The allowance to use additional test cases is not addressed in this QP.</p>
<p>3. QARD I.2.5.4.C states A description of each software item as it relates to the functional requirements.</p>	<p>3. QP 3.2 only requires this information for major software items, and not for all software.</p>
<p>4. QARD I.2.5.C.7 states Requirements and design information for source code for developed software or software modification.</p>	<p>4. It is not clear where this requirement is addressed in the QP.</p>
<p>5. QARD I.2.1.C Software including macros... shall have limited requirements applied as follows, 1) Listing of the baseline version and any changes to the software. 2) Documentation that the software provides correct results for a specified range of input parameters.</p>	<p>5. These requirements were not addressed in this QP.</p>
<p>6. 033-YMP-QP-3.2 Software QA Para. 3.2.2.1.E - Review of Software Baselines at control Points - Review of software baselines shall be performed and documented at the software control points. ...this review shall be conducted by the TL ...As appropriate, it shall summarize the status of the software at the control point with respect to:...a list of the baselines</p>	<p>6. There was no objective evidence to show that several of the NUFT software baseline elements were reviewed (end user documents, V&amp;V documents.)</p>
<p>7. Para. 3.2.2.6 Documentation - Software shall be documented sufficiently to demonstrate its ability to meet the intended needs of the affected organization.</p>	<p>7. Documentation produced to support the qualification/certification of NUFT was not sufficiently documented...(see specific missing documents described in item 8 through 15.)</p>

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<p>8. QP-3.2 section 3.2.2.1.A.4, states An ISP or ISP child document defines the design baseline. This is the software verification activity described in para. 3.2.2.3...it discusses design reviews and walkthroughs. As interpreted in this procedure, software verification consists of determining that the software product (true software and associated end user documentation) is consistent with the design baseline defined in the ISP.</p>	<p>8. No clear documentation of design baseline existed, in addition, the design reviews and walk-throughs were not documented.</p>
<p>9. QP-3.2 section 3.2.2.1.B states that life cycles shall be defined in the ISP by control points at which the software baseline elements are documented.</p>	<p>9. No documentation related to the software life cycle and control points for the NUFT code were identified.</p>
<p>10. QP 3.2 section 3.2.2.6.A. Requirements Information - the following requirements will ordinarily be met in a published code manual,...1). description of the overall nature and purpose of the software....shall meet this requirement by documenting the capabilities of the software. 2. Requirements for its intended use.</p>	<p>10. No QA records exist to show that these requirements were met.</p>
<p>11. QP-3.2 section 3.2.2.6.C Validation information...the following requirements must be met...1). The validation plan shall be described, ...and acceptance criteria for accomplishing the software validation.; 2). A record of the results of the execution of planned software validation, including the extent to which the results agreed with the specified acceptance criteria...</p>	<p>11. Contrary to this requirement, the acceptance criteria nor results were sufficiently documented to demonstrate that these requirements were met.</p>
<p>12. QP-3.2 section 3.2.2.1.D states the cases of software which is developed or modified, the ISP ... shall include a description of plans for meeting the documentation requirements of 3.2.2.6.</p>	<p>12. Contrary to this requirement there was no objective evidence of how the software was developed or modified.</p>
<p>13. QP 3.2 section 3.2.2.4 states The test plan and test case library shall be documented in a software validation plan, This plan may be contained in the ISP.....or some other document.</p>	<p>13. The procedure allows the test plan to be documented in other documents. However since the software validation plan is part of the ISP and it contains no test plan, nor was it identified where the test plan was...there is no objective evidence that this requirement was met.</p>

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<p><b>ISP-NF-13, Rev. 0 , CN-ISP-NF-13-0-2 requirements</b></p> <p>14. ISP-NF-13 states that the Software Verification and Validation plan will contain the applicable content of IEEE/ANSI 1012-1986.</p>	<p>contrary to the ISP requirements:</p> <p>14. the V&amp;V plan does not contain the applicable content of IEEE/ANSI 1012-1986.</p>
<p>15. ISP-NF-13 requires the Master file Folder to contain the following: Software Category Selection, Time History Development Doc., Theoretical Manual, User's Manual, Source Code, Software Verification and Validation Plan, Software Verification and Validation Report, Software Development Log, Test Case Library, Defect Resolution Log, Memo of Completion</p>	<p>15. The Master file Folder did not contain the following: Time History Development Doc. Theoretical manual User's manual source code SVVP - (has it, but out of date version) SDL Test Case - Defect Resolution log Memo -(there is one but it did not contain all required information) Documentation of reviews</p>