



Department of Energy

Washington, DC 20585

QA: QA

JAN 09 2002

J. A. McNeish
Bechtel SAIC Company, LLC
1180 Town Center Drive, M/S 423
Las Vegas, NV 89144

EVALUATION OF AMENDED RESPONSE TO, VERIFICATION OF CORRECTIVE ACTION AND CLOSURE OF DEFICIENCY REPORT (DR) BSC-01-D-131 RESULTING FROM THE OFFICE OF QUALITY ASSURANCE (OQA) AUDIT BSC-ARP-01-04

The OQA staff has evaluated the amended response, verified corrective actions of DR BSC-01-D-131 and determined the results to be satisfactory. As a result, the DR is considered closed.

If you have any questions, please contact either James Blaylock at (702) 794-1420 or Samuel E. Archuleta at (702) 794-1476.

OQA:JB-0489

James Blaylock for
Ram Murthy, Acting Director
Office of Quality Assurance

Enclosure:
DR BSC-01-D-131



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Nmss07
WM-11

JAN 09 2002

cc w/encl:

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Engelbrecht von Tiesenhausen, Clark County, Las Vegas, NV
R. W. Andrews, BSC, Las Vegas, NV
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J. E. Gebhart, BSC, Las Vegas, NV
Norman Graves, BSC, Las Vegas, NV
S. H. Horton, BSC, Las Vegas, NV
R. P. Keele, BSC, Las Vegas, NV, M/S 280
D. T. Krisha, BSC, Las Vegas, NV
T. J. Wall, BSC, Las Vegas, NV
D. M. Kunihiro, BSC, Las Vegas, NV
N. H. Williams, BSC, Las Vegas, NV
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W. J. Glasser, NQS, Las Vegas, NV
K. A. Hodges, NQS, Las Vegas, NV
D. G. Opielowski, NQS, Las Vegas, NV
J. R. Dyer, DOE/YMSCO, Las Vegas, NV
C. E. Hampton, DOE/YMSCO, Las Vegas, NV
D. G. Horton, DOE/YMSCO, Las Vegas, NV
J. M. Replogle, DOE/YMSCO, Las Vegas, NV
B. M. Terrell, DOE/YMSCO, Las Vegas, NV

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WASHINGTON, D.C.

8. ☒ DEFICIENCY REPORT
☐ CORRECTIVE ACTION
REPORT

NO. BSC-01-D-131

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DEFICIENCY/CORRECTIVE ACTION REPORT

1. Controlling Document:
AP-3.11Q, Rev 1/ICN 2, Technical Reports, and
AP-SI.1Q, Rev 2/ICN 4/ECN 1

2. Related Report No.:
BSC-ARP-01-04 Audit Report

3. Responsible Organization:
BSC Science and Analysis

4. Discussed With:
Jerry McNeish, Norman Graves, Steve Dana,
Steve Swenning

5. Requirement:

- AP-SI.1Q, Section 2, para. 2 states: "Software items subject to QARD requirements cannot be used for quality-affecting activities prior to the software being qualified and baselined except as provided for in Subsection 5.11 of this procedure."
- AP-SI.1Q, Section 2, para. 5 states: "Qualified software or software routines currently in the centralized baseline as of the effective date of this procedure shall be considered acceptable and part of the established baseline until the software item is changed. Any changes or revisions to a baselined item made by OCRWM personnel with OCRWM funds shall be handled in accordance with section 5.9 of this procedure."
- AP-3.11, Section 5.2e4) states in part: "Use of all software, including software routines or macros, to develop or support the results or conclusions of the technical product shall be documented in accordance with AP-SI.1Q."
- AP-SI.1Q, Section 5.8.3.2a) imposes requirements for the control and documentation of the use of software, and requires that the following be documented in the technical product: (1) A list of software by name, version/revision numbers, references to tracking numbers and qualification status. (2) Identification of inputs and outputs. (3) A statement indicating that the software was obtained from CM, appropriate for its intended use, and was used only within the range of validation. (4) Unique identification of the computer, including type, operating platform, and physical location.

6. Description of Condition:

- Contrary to requirements 1 and 2 above, ASHPLUME V 1.4LV was modified to develop ASHPLUME V 2.0, both of which were used in the Total System Performance Assessment for the Site Recommendation (TSPA-SR) Report, TDR-WIS-PA-000001, Rev 00/ICN 01 (Appendix C, Section C.3.1). V 1.4LV is a qualified/baselined code, however the modified version (V 2.0) was never qualified, nor was it approved for interim use, nor was it modified in accordance with Section 5.9 of AP-SI.1Q. This violation is similar to the violation described in DR BSC-01-D-068, which has been superceded by BSC-01-C-002.
- Contrary to requirements 3 and 4 above, the use of software was not properly documented in the technical product (i.e., The statement that all software was obtained from SCM is inaccurate. There was no statement that the software was appropriate for its intended use. Nor was the identification of the computer platform provided as specified in requirement 4(4) above).
- Contrary to requirements 3 and 4 above, there is contradiction regarding software version numbers. Table 2.2-1 indicates that Version 1.4LVdll was used, however, Appendix C, Table C-1 states that ASHPLUME V1.4LV was used. These are two separate, distinct versions of ASHPLUME (See Software Baseline Report).

7. Initiator:
Samuel E. Archuleta
Samuel E. Archuleta Date 9/4/01

9. Does a stop work condition exist? (Not required for a DR)
☐ Yes ☐ No
If Yes, Check One: ☐ A ☐ B ☐ C ☐ D

10. Recommended Actions:

11. QA Review:
Samuel E. Archuleta
QA Reviewer Samuel E. Archuleta Date 9/4/01

12. Response Due Date:
10 Working Days From Issuance

13. DOQA Issuance Approval:

Printed Name Ram Murthy

Signature *James Blaylock Jr*

Date 9/24/01

22. Corrective Actions Verified:
Samuel E. Archuleta
QA Reviewer Samuel E. Archuleta Date 1-7-02

23. Closure Approved by:
DOQA *James Blaylock Jr* Date 1/9/02

ENCLOSURE

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TYPE RESPONSE:

- ☒ Initial
☐ Complete
☐ Amended

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 DEC 12/01 QA: QA
DEFICIENCY/CORRECTIVE ACTION REPORT (RESPONSE)**14a. Immediate Actions:**Condition 1 Modification Development, and Utilization of ASHPLUME V2.0

Upon discovery of this condition, actions to qualify ASHPLUME V 2.0 were immediately initiated. The qualification process was completed on 9/28/01. Compliance date for this condition: 28 September, 2001

[Continued on Continuation Page]

14. Remedial Actions:Condition 1 Modification Development, and Utilization of ASHPLUME V2.0

ASHPLUME V 2.0 has been qualified and baselined in accordance with the requirements of AP-SI.1Q. This remedial action was completed on 9/28/01.

[Continued on Continuation Page]

15. Extent of Condition:Condition 1 Modification Development, and Utilization of ASHPLUME V2.0

A review of codes used by TSPA will be conducted pursuant to the extent of condition of BSC-01-D-088.

Condition 2 Use of Software not Properly Documented In Technical Product

A review of code documentation by TSPA will be conducted pursuant to the extent of condition of BSC-01-D-088.

Condition 3 Contradiction in Software Version Number.

This condition is considered unique to TDR-WIS-PA-000001.

16. Cause: (Attach results of root cause determination prepared in accordance with AP-16.4Q for a significant deficiency.)

The cause for this occurrence will be documented in the Submittal of the Completed Response.

17. Action to Preclude Recurrence:

Actions to preclude recurrence will be documented in the Submittal of the Completed Response.

18. Due Date: 1 December, 2002 2001 10/9/01

- ☒ For submittal of complete response
☐ For completion of corrective

19. Response by: Jerry McNeish

gms *Per JAMcNeish*

Date: 9 October, 2001 Phone: 295-6858

20. Evaluation: ☒ Accept ☐ Partially Accept ☐ Reject

QAR *Samuel E. Archuleta* Date 10-10-01

21. Concurrence:

DOQA *James Blaylock*

Date 10/19/01

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8. ☒ DR/CAR
☐ Stop Work Order

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DEFICIENCY/CORRECTIVE ACTION REPORT/STOP WORK ORDER CONTINUATION PAGE

14a. Immediate Actions: (cont.)

Condition 2 Use of Software not Properly Documented In Technical Product

None

Condition 3 Contradiction in Software Version Number.

None

14. Remedial Actions (cont.)

Condition 1 Modification Development, and Utilization of ASHPLUME V2.0 (continued)

The requirements for software utilization and documentation will be reviewed with all TSPA department personnel, specifically:

AP-SI.1Q Section 2 paragraph 2 "Software items subject of QARD requirements cannot be used for quality-affecting activities prior to the software being qualified and baselined except as provided for in Subsection 5.11 of this procedure."

AP-SI.1Q Section 2 paragraph 5 "Qualified software or software routines currently in the centralized baseline as of the effective date of the procedure shall be considered acceptable and part of the established baseline until the software item is changed. Any changes or revisions to a baselined item made by OCRWM personnel with OCRWM funds shall be handled in accordance with Section 5.9 of this procedure"

Ap-3.11 Section 5.2.e.4 "Use of all software, including software routines or macros, to develop or support the results or conclusion of the technical product shall be documented in accordance with AP-SI.1Q:

AP-SI.1Q Section 5.8.3.2a) which specifies the requirements for the control and documentation of the use of software in a technical document.

The above review will be prepared and transmitted to all TSPA Department personnel. TSPA Department personnel will document their review and understanding by signature on an acknowledgement form to be retained by TSPA as a record. This remedial action will be completed by 15 November, 2001

Additionally, TSPA personnel will conduct a review of work control practices to identify and correct weaknesses in the software development and utilization processes. This will incorporate any findings from other recent reviews of the TSPA process. This review and conclusions will be documented in a lessons learned. This remedial action will be completed by 15 November, 2001

Condition 2 Use of Software not Properly Documented In Technical Product

The records package for TDR-WIS-PA-000001 will be supplemented in accordance with Section 5.8 of AP-17.1Q, Record Source Responsibilities for Inclusionary Records, to incorporate the required information. This remedial action will be completed by 30 October 2001.

Condition 3 Contradiction in Software Version Number.

The records package for TDR-WIS-PA-000001 will be supplemented in accordance with Section 5.8 of AP-17.1Q, Record Source Responsibilities for Inclusionary Records, to incorporate the required information. This remedial action will be completed by 30 October 2001.

The remedial actions for conditions 2 and 3 will be accomplished with a single supplement to the records package.

A completed response to this DR will be submitted upon completion of the extent of condition of DR-BSC-01-D-088.

TYPE RESPONSE:

- ☐ Initial
☒ Complete
☐ Amended

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DEFICIENCY/CORRECTIVE ACTION REPORT (RESPONSE)**14a. Immediate Actions:**Condition 1 Modification Development, and Utilization of ASHPLUME V2.0

Upon discovery of this condition, actions to qualify ASHPLUME V 2.0 were immediately initiated. The qualification process was completed on 9/28/01. Compliance date for this condition: 28 September, 2001

[Continued on Continuation Page]

14. Remedial Actions:Condition 1 Modification Development, and Utilization of ASHPLUME V2.0

ASHPLUME V 2.0 has been qualified and baselined in accordance with the requirements of AP-SI.1Q. This remedial action was completed on 9/28/01.

[Continued on Continuation Page]

15. Extent of Condition:Condition 1 Modification Development, and Utilization of ASHPLUME V2.0

A review of codes used by TSPA has been conducted pursuant to the extent of condition of BSC-01-D-088. This review has revealed this condition was unique to ASHPLUME 2.0 in that TSPA personnel incorrectly assumed that exemptions for corroborative data also applied to the software producing the data. No other occurrences of a similar condition resulting from this misunderstanding were discovered in the review.

[Continued on Continuation Page]

16. Cause: (Attach results of root cause determination prepared in accordance with AP-16.4Q for a significant deficiency.)Condition 1 Modification Development, and Utilization of ASHPLUME V2.0

This condition occurred because TSPA personnel incorrectly applied the exemptions for corroborative data to the software producing the data. Additionally, in the past TSPA was schedule driven such that the incorrect application of the exemption was not questioned..

[Continued on Continuation Page]

17. Action to Preclude Recurrence:

All conditions noted resulted from a single cause noted in Block 16 and the action to preclude recurrence applies to all three conditions.

[Continued on Continuation Page]

15 wsw
18. Due Date: 1 December, 2001

- ☒ For submittal of complete response
☒ For completion of corrective action

19. Response by: Jerry McNeish

[Signature]
[Signature]

Date: November 30, 2001 Phone: 295-6858

20. Evaluation: ☐ Accept ☒ Partially Accept ☐ Reject

21. Concurrence:

QAR

[Signature]
[Signature]

Date 12-17-01

DOQA

[Signature]
[Signature]

Date 12/21/01

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8. ☒ DR/CAR
☐ Stop Work Order

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DEFICIENCY/CORRECTIVE ACTION REPORT/STOP WORK ORDER CONTINUATION PAGE

14a. Immediate Actions: (cont.)

Condition 2 Use of Software not Properly Documented In Technical Product

None

Condition 3 Contradiction in Software Version Number.

None

14. Remedial Actions (cont.)

Condition 1 Modification Development, and Utilization of ASHPLUME V2.0 (continued)

The requirements for software utilization and documentation were extracted from the applicable procedure (as noted below) and transmitted to all TSPA department personnel.

AP-SI.1Q Section 2 paragraph 2 "Software items subject of QARD requirements cannot be used for quality-affecting activities prior to the software being qualified and baselined except as provided for in Subsection 5.11 of this procedure."

AP-SI.1Q Section 2 paragraph 5 "Qualified software or software routines currently in the centralized baseline as of the effective date of the procedure shall be considered acceptable and part of the established baseline until the software item is changed. Any changes or revisions to a baselined item made by OCRWM personnel with OCRWM funds shall be handled in accordance with Section 5.9 of this procedure"

Ap-3.11 Section 5.2.e.4 "Use of all software, including software routines or macros, to develop or support the results or conclusion of the technical product shall be documented in accordance with AP-SI.1Q:

AP-SI.1Q Section 5.8.3.2a) which specifies the requirements for the control and documentation of the use of software in a technical document.

TSPA Department personnel will document their review and understanding by return e-mail. TSPA staff will prepare a package of the initial e-mail and return e-mails for the QAR. This remedial action will be completed by 15 December, 2001

Condition 2 Use of Software not Properly Documented In Technical Product

The records package for TDR-WIS-PA-000001 was supplemented in accordance with Section 5.8 of AP-17.1Q, Record Source Responsibilities for Inclusionary Records, to incorporate the required information. This information was submitted to Document Control on 30 October 2001.

Condition 3 Contradiction in Software Version Number.

The records package for TDR-WIS-PA-000001 was supplemented in accordance with Section 5.8 of AP-17.1Q, Record Source Responsibilities for Inclusionary Records, to incorporate the required information. This information was submitted to Document Control on 30 October 2001.

15. Extent of Condition (cont.):

Condition 2 Use of Software not Properly Documented In Technical Product

This condition resulted from the misunderstanding that caused Condition 1 to occur. A review of software documentation in TSPA technical products did not reveal any similar conditions resulting from this misunderstanding..

Condition 3 Contradiction in Software Version Number.

A review of software documentation in TSPA technical products did not reveal any similar conditions resulting from utilization of multiple versions of the same software.

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15. Extent of Condition (cont.):

IMPACT

This software has been qualified and therefore there is no impact.

16. Cause: (cont.)

Condition 2 Use of Software not Properly Documented In Technical Product

The software was not properly documented as a result of the cause for Condition 1

Condition 3 Contradiction in Software Version Number.

Three different versions of the ASHLUME software were used in TDR-WIS-PA-000001. Because one of these versions was not documented due to the cause for conditions 1 and 2 it was difficult for those not aware of this situation to understand which version of the software was used in which sections of the analysis.

17. Action to Preclude Recurrence (cont.)

This was an isolated incident resulting from a misunderstanding of how corroborative data, which does not have to be qualified, can be generated. The activities described in Block 14 have TSPA personnel now aware that the exemptions for data do not apply to the software generating that data.

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The Complete Response dated November 30, 2001 is partially accepted. The following issues require your attention by the due date indicated by DOE/OQA. Also, an amended date for completion of corrective action is required in your amended complete response..

1. **Page 2, Item 16, Extent of Condition for Condition 2:** Please describe the review methodology and describe how the review was documented. That is, what objective evidence will be made available to the QAR for verification.
2. **Page 3, Item 15, Impact:** Please describe how the impact was assessed to determine that there is no impact. What objective evidence will be made available to the QAR for verification.
3. **Page 3, Item 16, Cause for Condition 3:** The response is unclear. Does the response mean that there were administrative errors in documenting the use of software? Or does the response indicate that TSPA Personnel did not actually know what version of the software they were using? Please clarify this response and describe corrective actions to address this cause



Sam E. Archuleta
QA Representative

12-17-01

TYPE RESPONSE:

- ☐ Initial
☒ Complete
☒ Amended

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DEFICIENCY/CORRECTIVE ACTION REPORT (RESPONSE)**14a. Immediate Actions:**Condition 1 Modification Development, and Utilization of ASHPLUME V2.0

Upon discovery of this condition, actions to qualify ASHPLUME V 2.0 were immediately initiated. The qualification process was completed on 9/28/01. Compliance date for this condition: 28 September, 2001

[Continued on Continuation Page]

14. Remedial Actions:Condition 1 Modification Development, and Utilization of ASHPLUME V2.0

ASHPLUME V 2.0 has been qualified and baselined in accordance with the requirements of AP-SI.1Q. This remedial action was completed on 9/28/01.

[Continued on Continuation Page]

15. Extent of Condition:Condition 1 Modification Development, and Utilization of ASHPLUME V2.0

A review of codes used by TSPA has been conducted pursuant to the extent of condition of BSC-01-D-088. This review has revealed this condition was unique to ASHPLUME 2.0 in that TSPA personnel incorrectly assumed that exemptions for corroborative data also applied to the software producing the data. No other occurrences of a similar condition resulting from this misunderstanding were discovered in the review.

[Continued on Continuation Page]

16. Cause: (Attach results of root cause determination prepared in accordance with AP-16.4Q for a significant deficiency.)Condition 1 Modification Development, and Utilization of ASHPLUME V2.0

This condition occurred because TSPA personnel incorrectly applied the exemptions for corroborative data to the software producing the data. Additionally, in the past TSPA was schedule driven such that the incorrect application of the exemption was not questioned..

[Continued on Continuation Page]

17. Action to Preclude Recurrence:

All conditions noted resulted from a single cause noted in Block 16 and the action to preclude recurrence applies to all three conditions.

[Continued on Continuation Page]

18. Due Date: 20 December, 2001

- ☒ For submittal of complete response
☒ For completion of corrective action 12/19/01

19. Response by: Jerry McNeish

[Signature] *[Signature]* *[Signature]* 12/24/01
BSC BE
Date: December 19, 2001 Phone: 295-6858

20. Evaluation: ☒ Accept ☐ Partially Accept ☐ Reject

QAR *[Signature]* Date 1-7-02

21. Concurrence:

DOQA *[Signature]* Date 1/9/02

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14a. Immediate Actions: (cont.)

Condition 2 Use of Software not Properly Documented In Technical Product

None

Condition 3 Contradiction in Software Version Number.

None

14. Remedial Actions (cont.)

Condition 1 Modification Development, and Utilization of ASHPLUME V2.0 (continued)

The requirements for software utilization and documentation were extracted from the applicable procedure (as noted below) and transmitted to all TSPA department personnel.

AP-SI.1Q Section 2 paragraph 2 "Software items subject of QARD requirements cannot be used for quality-affecting activities prior to the software being qualified and baselined except as provided for in Subsection 5.11 of this procedure."

AP-SI.1Q Section 2 paragraph 5 "Qualified software or software routines currently in the centralized baseline as of the effective date of the procedure shall be considered acceptable and part of the established baseline until the software item is changed. Any changes or revisions to a baselined item made by OCRWM personnel with OCRWM funds shall be handled in accordance with Section 5.9 of this procedure"

Ap-3.11 Section 5.2.e.4 "Use of all software, including software routines or macros, to develop or support the results or conclusion of the technical product shall be documented in accordance with AP-SI.1Q:

AP-SI.1Q Section 5.8.3.2a) which specifies the requirements for the control and documentation of the use of software in a technical document.

TSPA Department personnel will document their review and understanding by return e-mail. TSPA staff will prepare a package of the initial e-mail and return e-mails for the QAR. This remedial action will be completed by 15 December, 2001

Condition 2 Use of Software not Properly Documented In Technical Product

The records package for TDR-WIS-PA-000001 was supplemented in accordance with Section 5.8 of AP-17.1Q, Record Source Responsibilities for Inclusionary Records, to incorporate the required information. This information was submitted to Document Control on 30 October 2001.

Condition 3 Contradiction in Software Version Number.

The records package for TDR-WIS-PA-000001 was supplemented in accordance with Section 5.8 of AP-17.1Q, Record Source Responsibilities for Inclusionary Records, to incorporate the required information. This information was submitted to Document Control on 30 October 2001.

Corrective actions are complete and ready for verification

15. Extent of Condition (cont.):

Condition 2 Use of Software not Properly Documented In Technical Product

This condition resulted from the misunderstanding that caused Condition 1 to occur. Software documentation in TSPA technical products was reviewed. The results of this review showed that TDR-WIS-PA-0001 stated qualified software was obtained from SCM and that unqualified software was controlled in accordance with AP-SI.1Q. Software used to support this technical report was listed in Table 2.2-1 with software platforms identified. Later in this section it was stated that the software qualification process provided a through check that the software is calculating what it was designed to calculate as long as it is used within its design specifications.

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15. Extent of Condition (cont.):Condition 2 Use of Software not Properly Documented In Technical Product (continued)

The review of MDL-WIS-PA-000002 showed that software documentation indicated that qualified software was obtained from SCM and that single use software was documented in accordance with AP-SI.1Q. Table 3-1 listed the software used and the platform the software operated under. Each software was described as being appropriate for its intended use with the exception of FEHM which was unqualified at the time which would preclude stating it was appropriate for its intended use. The results of this review have been transmitted to and concurred with by TSPA management via e-mail.

Condition 3 Contradiction in Software Version Number.

A review of software documentation in TSPA technical products did not reveal any similar conditions resulting from utilization of multiple versions of the same software.

IMPACT

It has been determined that utilizing this software prior to qualification did not impact the results or conclusions of TDR-WIS-PA-000001. This conclusion is based on the fact that the software has been qualified and shown to produce results that are consistent with a natural analog and that the results an impact evaluation transmitted to the NRC in a letter report, *Transmittal of Evaluation of the Impact of Unqualified Software and Data on Total system Performance Assessment for the Site Recommendation, (TSPA-SR), Revision 0, and ICN*, concluded that the use of unqualified software did not impact the results or conclusions of SR products.

16. Cause: (cont.)Condition 2 Use of Software not Properly Documented In Technical Product

The software was not properly documented as a result of the cause for Condition 1

Condition 3 Contradiction in Software Version Number.

Three different versions of the ASHLUME software were used in TDR-WIS-PA-000001. Due to an administrative/editorial error the document did not clearly delineate which version of the software was used in which sections of the analysis.

17. Action to Preclude Recurrence (cont.)

This was an isolated incident resulting from a misunderstanding of how corroborative data, which does not have to be qualified, can be generated. The activities described in Block 14 have TSPA personnel now aware that the exemptions for data do not apply to the software generating that data.

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Verification of corrective actions/commitments was completed on this date, as follows:

1. Verified, by review of the Software Baseline Report, dated November 30, 2001, that ASHPLUME V2.0 was baselined on September 28, 2001. (See Attachment 1). This action satisfactorily addressed deficient condition 1 and the immediate action commitment for condition 1.
2. Verified that missing information cited in condition 2 and the contradiction cited in condition 3 have been corrected by review of a supplement (MOL.20020104.0407-0408) to the records package for the Total System Performance Assessment for Site Recommendation (TSPA-SR) TDR-WI-PA-000001, Rev 00/ICN 01. (See Attachment 2). This action satisfactorily addresses deficient conditions 2 and 3 and remedial action commitments for conditions 2 and 3.
3. Verified the contents of a package (Lessons Learned) that was prepared for review by all TSPA personnel in which the requirements that were cited in the deficiency document were defined. (See Attachment 3). TSPA personnel were required to document their review and understanding of the requirements by return email. The QAR reviewed the emails and confirms completeness of the review. Return emails are NOT attached. An additional "Lessons Learned" was developed and circulated to TSPA Managers, in which there was discussion of new management controls regarding prevention of similar recurrences. (See Attachment 4). These actions satisfactorily addresses the cause of all three deficiencies cited in this Deficiency Report and satisfy the remedial action commitment for all three deficient conditions. This activity also satisfactorily addresses the action to preclude recurrence commitment for all three deficient conditions as they relate to the stated cause.
4. Extent of condition was determined by a review of TSPA Technical Documents by a member of the Performance Assessment staff. Completion of the review and his determination that there were no similar deficiencies discovered are documented in an email to the Responsible Manager, who concurred in the findings of the review. (See Attachment 5). The QAR concurs that this was an isolated occurrence, resulting from the misunderstanding that unqualified software could be used to generate unqualified data which would then be used in corroboration of qualified data.

Impact: The results of a full review of all software in support of the TSPA-SR are documented in a formal transmittal to the Nuclear Regulatory Commission (NRC). The evaluations conducted for the purpose of reporting status to the NRC were that the use of any unqualified software did not impact the results or conclusions of any of the Site Recommendation- related products. (See Attachment 6).

All actions taken in response to this Deficiency Report are deemed to be appropriate, effective, and sufficient. Recommend that this DR be closed at this time.



Sam E. Archuleta
QA Representative

1-7-02
Date

Page: 1 of 1

4. No. of Pages

2

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Norman Graves
01/07/2002 08:22 AM

To: Jerry McNeish/YM/RWDOE@CRWMS
cc: Marco Lee/YM/RWDOE@CRWMS

Subject: Remedial Actions for Resolution of DR131

QA:QA Inclusionary

Corrective actions for Conditions 2 and 3 of DR 131 require supplementing the records package for TDR-WIS-PA-000001 Rev. 01 to include the following:

Condition 2 Use of Software not properly documented In Technical Product:

The following information is provided to clarify/correct software documentation. :

Procedurally required documentation of the use of software described in the this technical report is contained in the TSPA Model Report, MDL-WIS-PA-000002

The software EQ3/6 was incorrectly included in Table 2.2-1. EQ3/6 was not directly used in preparing this report. It was used to generate data documented in upstream documents supporting this report and the TSPA Model Report, MDL-WIS-PA-000002.

ASHPLUME V2.0 and ASHPLUME 1.4LV were not identified in Table 2.2-1 as codes used in TDR-WIS-PA-000001 Rev. 01. Both codes were used to generate information presented in Appendix C, Section C-3. The information to be appended to Table 2.2-1 is as follows

Table 2.2-1(Addendum) Listing of Software Utilized in the TSPA-SR

| Computer Code | Version | STN/CSCI/AMR | Qualification Status | Platform |
|---------------|---------|----------------|----------------------|------------|
| ASHPLUME | 1.4LV | 10022 1.4LV 00 | Qualified | UNIX |
| ASHPLUME | 2.0 | 10022 2.0 00 | Qualified | WINDOWS NT |

Condition 3 Contradiction in Software Version Number:

Three different versions of ASHPLUME were used in the TSPA-SR. All references to ASHPLUME other than in Appendix C are to ASHPLUME 1.4dll, which is a DLL version of ASHPLUME. This applies regardless of how the reference is presented, i.e. ASHPLUME 1.4LV or just ASHPLUME. ASHPLUME 1.4LV is a stand-alone executable version of ASHPLUME. References to ASHPLUME 1.4LV in Appendix C are as presented. References to ASHPLUME 2.0 in Appendix C are also as presented.

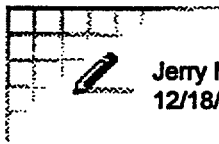
| OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT | | QA: N/A | |
|--|----------------------------------|------------------|-------------------|
| LESSONS LEARNED | | Page of | |
| SECTION I | | | |
| 1. Originator: (Print and Sign) Jerry McNeish | 2. Department/Organization: TSPA | 3. Date: 11/8/01 | 4. Telephone No. |
| 5. Title: Remedial Action in Response to BSC-01-DR-131 Condition 1, Modification, Development, and Utilization of Software | | | |
| 6. Priority Descriptor: Blue | | | |
| 7. Functional Category: Software | | | |
| 8. Lessons Learned Statement: Software utilized in quality affecting activities must be obtained, modified, and utilized in accordance with the provisions of AP-SI.1Q. Specifically: <p>AP-SI.1Q Section 2 paragraph 2 "Software items subject of QARD requirements cannot be used for quality-affecting activities prior to the software being qualified and baselined except as provided for in Subsection 5.11 of this procedure."</p> <p>AP-SI.1Q Section 2 paragraph 5 "Qualified software or software routines currently in the centralized baseline as of the effective date of the procedure shall be considered acceptable and part of the established baseline until the software item is changed. Any changes or revisions to a baselined item made by OCRWM personnel with OCRWM funds shall be handled in accordance with Section 5.9 of this procedure"</p> <p>AP-3.11 Section 5.2.e.4 "Use of all software, including software routines or macros, to develop or support the results or conclusion of the technical product shall be documented in accordance with AP-SI.1Q:</p> <p>AP-SI.1Q Section 5.8.3.2a) which specifies the requirements for the control and documentation of the use of software in a technical document</p> | | | |
| 9. Analysis ASHPLUME V2.0 was developed from ASHPLUME 1.4LVdII by replacing the eruption parameters of volume and plume height with the parameters eruption power and duration to determine how this change would affect the results. The results from both versions of the code were then compared to a real world analogue (Serria Negra) to evaluate the extent of differences in the results. The results of this comparison were reported in the TSPA-SR but were not used to support any conclusions or recommendations in the SR. Because ASHPLUME 2.0 was used only to corroborate the results obtained with ASHPLUME 1.4dII it was assumed the code did not have to be qualified. Although corroborative data does not have to be qualified no such exemption exists in AP-SI.1Q for software use. As a result the use of ASHPLUME V2.0 was not in compliance with program requirements. | | | |
| 10. Resolution TSPA management and personnel have reviewed and increased their understanding of the requirements for software utilization. A thorough review of all software used in TSPA has been performed and is in compliance with existing requirements. All future software modifications and utilization's will be reviewed by management and staff to ensure program requirements for software utilization are complied with. | | | |
| 11. References: | | | |
| 12. Estimated Cost Savings/Cost Avoidance: (Optional) | | | |
| SECTION II | | | |
| 13. Lessons Learned Program Coordinator: (Print and Sign) | | 14. Date | 15. Telephone No. |
| 16. Tracking Number: | 17. Keywords: | | |

AP-REG-001.1

| OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT | | | QA: N/A |
|---|----------------------------------|-------------------|---------------------------|
| LESSONS LEARNED | | | Page of |
| SECTION I | | | |
| 1. Originator: (Print and Sign) Jerry McNeish | 2. Department/Organization: TSPA | 3. Date: 11/14/01 | 4. Telephone No: 295-6858 |
| 5. Title: Remedial Action in Response to BSC-01-DR-131 Condition 1, Modification, Development, and Utilization of Software | | | |
| 6. Priority Descriptor: Blue | | | |
| 7. Functional Category: Software | | | |
| 8. Lessons Learned Statement: <p>TSPA personnel have conducted a review of software work control practices to identify and correct weaknesses in the software development and utilization processes. "This is an informally prepared, internal Lessons Learned activity which employs use of this form for convenience only. It is the intent of this Lessons Learned, with concurrence of the QAR, that it is to be neither prepared nor processed formally, in compliance with AP-Reg-001."</p> <p>From this review it has been determined that past practices did not adequately control software development, modification and utilization activities within TSPA. Additionally, it has been determined that TSPA schedules have not provided sufficient time to ensure all software development, modification and utilization requirements will be met.</p> | | | |
| 9. Analysis <p>This condition resulted from weaknesses in the software work control practices employed by TSPA. These work control practices evolved in a schedule driven environment and were not reviewed and formalized to provide the degree of control necessary to met the requirements accompanying activities performed in a government regulated environment.</p> | | | |
| 10. Resolution <p>TSPA management and personnel have reviewed and increased their understanding of the requirements for software utilization. As a result future software practices will include:</p> <p>Management and staff will review all future software modifications and utilization's to ensure program requirements for software utilization are complied with.</p> <p>TSPA has enlisted the support of the CIO organization to obtain and implement software and programs that will provide the controls necessary.</p> <p>In the future TSPA schedules will have to be revised and extended to comply with software requirements when it is determined additional software development or modification activities are necessary to address scientific or technical questions that arise during the analysis.</p> | | | |
| 11. References: | | | |
| 12. Estimated Cost Savings/Cost Avoidance: (Optional) | | | |
| SECTION II | | | |
| 13. Lessons Learned Program Coordinator: (Print and Sign) | | 14. Date | 15. Telephone No. |
| 16. Tracking Number: | 17. Keywords: | | |

AP-REG-001.1

Rev. 08/21/00



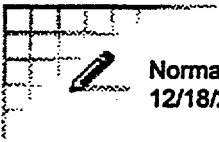
Jerry McNeish
12/18/2001 03:40 PM

To: Norman Graves/YM/RWDOE@CRWMS
cc:

Subject: Re: Review of TSPA Technical Documents in Response to DR - 131 

Not A Federal Record

I concur.
-Jerry
Norman Graves



Norman Graves
12/18/2001 03:39 PM

To: Jerry McNeish/YM/RWDOE@CRWMS
cc:

Subject: Review of TSPA Technical Documents in Response to DR - 131

QA:N/A Exclusionary

Attached are the results of my review of TSPA Technical Documents listed in the OPE database. If you concur with my findings please respond via e-mail noting your concurrence.



Review of TSPA Technical Documentation In Respon

Review of TSPA Technical Documentation In Response to DR -131

I have conducted a review of TSPA Technical Documents as identified in the OPE database. From this review I did not discern any use of unqualified software to produce corroborative data as was done with ASHPLUME in the TSPA-SR. As a result I have concluded that this condition is limited to the TSPA-SR.

Norman L. Graves

DR BSC-01-D-131 Verification
Attachment 5



Department of Energy
Office of Civilian Radioactive Waste Management
Yucca Mountain Site Characterization Office
P.O. Box 30307
North Las Vegas, NV 89036-0307

QA: N A

AUG 31 2001

OVERNIGHT MAIL

C. William Reamer, Chief
High-Level Waste Branch
Division of Waste Management
Office of Nuclear Materials Safety
and Safeguards
U.S. Nuclear Regulatory Commission
Two White Flint North
Rockville, MD 20852

**TRANSMITTAL OF EVALUATION OF THE IMPACT OF UNQUALIFIED SOFTWARE
AND DATA ON TOTAL SYSTEM PERFORMANCE ASSESSMENT FOR THE SITE
RECOMMENDATION. (TSPA-SR). REVISION 0. ICN1**

This letter transmits the results of the evaluation of the significance and impact of unqualified data and unqualified software review on the results and conclusions of the TSPA-SR, Revision 00. ICN 01 and the status of the ongoing model validation. In addition, the U.S. Department of Energy (DOE) agreed in the June 13, 2001, U.S. Nuclear Regulatory Commission (NRC)/DOE Management Meeting to either include an analysis of the *FY01 Supplemental Science and Performance Analyses*, Revision 00 (SSPA) in this impact assessment, or an explanation of why an analysis of the SSPA was not needed. This letter explains why an evaluation of the SSPA was not included in the impact assessment.

The five enclosures to this letter provide detail on the evaluations of the impact of unqualified data and software on TSPA-SR, and the status of the model validation review. The enclosures are summarized in the following paragraphs:

Enclosure 1: *Data Verification and Qualification Process Description and Status* describes the process used for data verification and qualification. The process is incorporated into Yucca Mountain Site Characterization Project administrative procedures and was discussed with the NRC during a Technical Exchange on January 31, 2001. A status of this effort, also provided in Enclosure 1, indicates that, as of August 22, 2001, more than 99 percent of the required data verifications and 93 percent of required data qualification/document changes have been completed. Most of the remaining data qualification actions will be completed by changes to the affected Analysis and Model Reports (AMR), which involve editorial or administrative interim change notices that do not materially alter the framework or outputs of the associated AMR. The total population of data sets that have been put through these processes is more than 1,200. Further, the verification checklist reject rates have been relatively low, approximately

YMP-5

**DR BSC-01-D-131 Verification
Attachment 6 (4 Pages)**

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3 percent, and are typically related to documentation and records issues, not the validity of the data itself. Therefore, the qualification activities and results to date provide a high level of confidence in the traceability, retrievability, and quality of data supporting the conclusions of the TSPA-SR.

Enclosure 2: *Impact Assessment for Unqualified Data Used to Support TSPA-SR* describes the assessment of the impact of the specific data to be qualified that were used to support the TSPA-SR. It includes the actual impact assessment forms, as well as tabular data listing the unqualified data in appropriate formats to assist in understanding the details. The impacts of unqualified data on TSPA-SR were evaluated within the regulatory compliance period of 10,000 years. Only 51 unique data sets (identified by data tracking numbers (DTNs)) of the 1,200 data sets used have not been qualified; these unqualified data sets have been judged to have no impact on the TSPA-SR results.

Enclosure 3: *Software Qualification Process Description and Status* describes the software qualification process and the status of software-related deficiency reports (DRs) for TSPA-SR supporting software. TSPA-SR is supported by more than 400 computer software code variants. As of August 24, 2001, all but seven unique codes and one platform variant have been qualified. Qualification of these remaining seven codes is well underway and will be complete prior to a recommendation by the Secretary. Benchmark testing indicates that these seven codes are performing according to their specifications.

Enclosure 4: *Impact Assessment for Unqualified Software Used to Support TSPA-SR* describes the methodology used to prepare the impact assessments and the results of the impact assessments. The actual detailed impact assessments for each unqualified software package and software associated with the DRs are included. In all cases, the use of unqualified software was identified and assessed. The assessment concluded that the issues associated with the software did not represent an adverse impact to the analyses that the software supported.

Enclosure 5: *In-Process Review of Status of Model Validation* summarizes the ongoing model validation review effort and the results to date. No model development issues have been identified that would impact the conclusions of the TSPA-SR. The results of this model validation review will be provided to the NRC in mid-October.

The *Yucca Mountain Science and Engineering Report* (S&ER) and TSPA-SR were the principal documents supporting the *Preliminary Site Suitability Evaluation* (PSSE). Since the completion of the AMRs, TSPA-SR, and the S&ER, a number of model enhancements/refinements and alternative analyses have been performed to evaluate the robustness of the models and analyses used in the S&ER. In general, these models and analyses were performed to update or supplement information to evaluate the following issues:

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1. More complete evaluation of the effects of unquantified uncertainties on the results and conclusions of the TSPA;
2. Continued development of an increased scientific basis for projecting waste package performance;
3. Analyze the possible performance of a cooler thermal-operating mode; and
4. Development of additional lines of evidence that do not depend on the performance assessment.

These modified models and analyses are documented in the SSPA. Portions of these models and analyses, by design, consider data that was not fully qualified, software that had not completed the qualification effort, and models that have not been validated. The impacts of these unqualified portions of the inputs to the SSPA are discussed below.

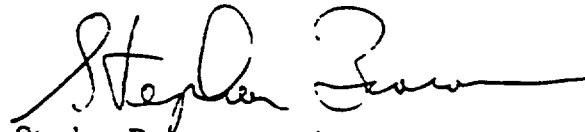
The models developed and used as part of the SSPA were based on the most current and best available scientific information, including some models which were not produced using quality assurance procedures that are required if such models (and their associated data and software) are to be used in any subsequent license application. In the development of the SSPA, it was recognized that these models were appropriate to provide additional insights into possible repository performance. The resulting comparative analyses extended the range of applicability of the TSPA conclusions and tested the robustness of the results and conclusions presented in the AMRs, process model reports, and the TSPA-SR. These models, associated data and software do not replace the controlled baseline set of models, data, or software used as a basis for TSPA-SR. The supplemental models and analyses presented in the SSPA tend to confirm the models and analyses used in the baselined AMRs and are deemed corroborative in nature. Some results from the SSPA were presented and discussed in the PSSE to provide additional insights for parameters, models, and operating modes.

The unqualified portion of the data, software and models used in the development of the models and analyses described in the SSPA are not part of the baseline for TSPA-SR; therefore, they do not require impact assessments. All such data, software, and models will be fully qualified if these supplemental models were to be used in a potential license application. Decisions as to the models that would form the basis of any potential subsequent licensing process will be made in future planning.

In conclusion, our evaluation of the significance of unqualified data and software and the ongoing model validation review have found no impact that would challenge the results or conclusions of the TSPA-SR. However, the model validation review is continuing. The results of this review will be made available to the NRC in mid-October 2001. The models and analyses described in the SSPA are primarily supplemental in nature; therefore, the unqualified portion of the data, software, and models do not require an impact evaluation. In the event that any of these continuing efforts identifies a problem that impacts the results or conclusions of the TSPA-SR, DOE will notify the NRC.

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We recommend a meeting be held to address any questions you may have on the enclosed material and impact evaluation. Please contact April V. Gil at (702) 794-5578 to schedule the interaction.



Stephan Brocoun, Assistant Manager
Office of Licensing and Regulatory
Compliance

OL&RC:AVG-1679

Enclosures:

1. *Data Verification and Qualification Process Description and Status*
2. *Impact Assessment for Unqualified Data Used to Support TSPA-SR*
3. *Software Qualification Process Description and Status*
4. *Impact Assessment for Unqualified Software Used to Support TSPA-SR*
5. *In-Process Review of Status of Model Validation*
6. *Acronyms*

cc w/encls:

W. L. Belke, NRC, Las Vegas, NV
L. L. Campbell, NRC, Rockville, MD
N. K. Stablein, NRC, Rockville, MD (2 cys)
B. J. Garrick, ACNW, Rockville, MD
W. C. Patrick, CNWRA, San Antonio, TX
W. D. Barnard, NWTRB, Arlington, VA
R. R. Loux, State of Nevada, Carson City, NV
Irene Navis, Clark County, Las Vegas, NV
L. W. Bradshaw, Nye County, Pahrump, NV