Department of Energy
Washington, DC 20585

QA: QA

APR 25 2002

S. H. Swenning
Bechtel SAIC Company, LLC
1180 Town Center Drive, M/S 423
Las Vegas, NV 89144

VERIFICATION OF CORRECTIVE ACTIONS AND CLOSURE OF DEFICIENCY REPORT (DR) BSC-01-D-080

The Office of Quality Assurance staff has evaluated the corrective actions of DR BSC-01-D-080 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 William J. Glasser at (702) 794-5014.

James Blaylock

Ram Murthy, Acting Director
Office of Quality Assurance

OQA:JB-1082

Enclosure:
DR BSC-01-D-080

NWM5507
WM-11

cc w/encl:
N. K. Stablein, NRC, Rockville, MD
Robert Latta, NRC, Las Vegas, NV
S. W. Lynch, State of Nevada, Carson City, NV
Engelbrecht von Tiesenhausen, Clark County, Las Vegas, NV
S. R. Dana, BSC, Las Vegas, NV, M/S 280
S. H. Hobbs, 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
D. M. Kunihiro, BSC, Las Vegas, NV
M. D. Voegele, BSC, Las Vegas, NV
T. J. Wall, BSC, Las Vegas, NV
W. J. Glasser, 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
S. P. Mellington, 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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RADIOACTIVE WASTE MANAGEMENT
U.S. DEPARTMENT OF ENERGY
WASHINGTON, D.C.

8. ☒ DEFICIENCY REPORT
☐ CORRECTIVE ACTION REPORT

ORIGINAL
THIS IS A RED STAMP

NO. BSC-01-D-080

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DEFICIENCY/CORRECTIVE ACTION REPORT

1. Controlling Document:
AP 16.1Q, Rev. 4, ICN 1 "Management of Conditions Adverse to Quality"

2. Related Report No.:
NA

3. Responsible Organization:
Bechtel SAIC Company, LLC

4. Discussed With:
Robert Andrews, William Watson, Sam Hobbs

5. Requirement:
The Quality Assurance Requirements and Description (DOE/RW-0333P, Revision 10, QARD) defines a Condition Adverse to Quality as "A state of noncompliance with quality assurance program requirements."

AP 16.1Q, Rev. 4, ICN 1 States:
3.2 Deficiency - A CAQ [Condition Adverse to Quality] concerning an activity, attribute, documentation, or procedure that renders the quality of an activity unacceptable or indeterminant.
5.2.1 a) Upon determination of a deficiency, complete the Initiator actions on [a DR/CAR form] ...
5.2.1 b) Forward the DR/CAR form to the CAC [Corrective Action Coordinator].

6. Description of Condition:
Contrary to the requirements to initiate a DR/CAR form and forward it to the CAC, during the period following completion of the "TSPA Model for Site Recommendation" (MDL-WIS-PA-000002, Rev. 00), several errors were found and maintained in a list of errata. Some of the errors could immediately be classified (by knowledgeable individuals within the PA organization) as having little or no effect on the results of the TSPA Model Report; however a number of other errors could not be so classified without performing additional analyses or model runs. Since there is no documentation that an initial determination was made that these errata were such that there was little or no effect, the quality of the TSPA Model report must be considered indeterminant during the time period between discovery and completion of such additional analyses or model runs. Failure to initiate a DR/CAR form for those errors that rendered the quality indeterminant is a violation of the requirements of AP-16.1Q, Rev. 4, ICN 1.

7. Initiator:
S. Hobbs Sam Hobbs Date 05/31/01

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:

1. Limit the scope of this deficiency to the failure to initiate DR/CAR forms for issues related to technical documents.

2. Recommend the development of a process (procedure conrols) to manage errors discovered after a technical document has been approved and released.

11. QA Review:
QAR WILLIAM J. GLASSER William J. Glasser Date 6-5-01

12. Response Due Date:
10 Working Days From Issuance

13. DOQA Issuance Approval:
Printed Name Robert W. Clark Signature James Blaylock for Date 6/7/01

22. Corrective Actions Verified:
QAR William J. Glasser William J. Glasser Date 4/19/02

23. Closure Approved by:
DOQA James Blaylock for Date 4/25/02

Exhibit AP-16.1Q.1 Rev. 12/20/1999

ENCLOSURE 1 of 37

TYPE RESPONSE:
☒ Initial
☐ Complete
☐ Amended

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DEFICIENCY/CORRECTIVE ACTION REPORT (RESPONSE)

14a. Immediate Actions:

Concurrent with preparation of DR 080, the requirement to prepare Deficiency Reports for Conditions Adverse to Quality was discussed by William Watson, Science & Analysis Integration Manager with Jerry McNeish, TSPA Department Head and key staff.

Completion Date: week of 28 May 2001

14. Remedial Actions:

In order to assure that the Condition Adverse to Quality is understood by the members of Science & Analysis who perform work on technical documents (AP-3.10Q and AP-3.11Q reports), a series of group meetings will be held during July. The group meetings will be conducted by William Watson, Science & Analysis Integration Manager and will be held at Las Vegas, LANL, LBNL, LLNL and SNL. The purpose of the group meetings is to discuss the specific issues associated with Deficiency Report BSC-01-D-080 involving procedure AP-16.1Q *Management of Conditions Adverse to Quality*. Any Science & Analysis personnel that cannot attend the established group meetings will receive the same information by direct communication with their respective Department Head or Lab Lead, as appropriate.

See Continuation Page for remainder of Block 14
Completion Date: 23 July 2001

15. Extent of Condition:

The extent of condition has established as the entire Science & Analysis Project to assure that the requirement to prepare Deficiency Reports is clearly understood.

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

The apparent cause is the belief by members of the TSPA Department that an error is only a Condition Adverse to Quality if it was caused by a failure to follow the procedure or if it results in unacceptable quality of the technical product. There was not full understanding that a Condition Adverse to Quality exists if the quality of a technical product is indeterminate.

17. Action to Preclude Recurrence:

The project is reviewing Recommended Action #2 to determine the appropriate level of procedural controls for tracking of errata found following the issue of a technical document (AP-3.10Q or AP-3.11Q report). One method under consideration is to use the Condition/Issue Identification and Reporting/Resolution System (CIRS) to identify, screen and track errata found after the issue of technical documents. The conclusion of the review will be documented in the Complete Response.

Completion Date: 30 July 2001

18. Due Date: 30 July 2001
☒ For submittal of complete response
☐ For completion of corrective action (all actions are complete)

19. Response by: Jerry McNeish
Jerry A McNeish
Date: June 26, 2001 Phone: 5-6858

20. Evaluation: ☐ Accept ☒ Partially Accept ☐ Reject
QAR William J. Glasser Date 7-6-01

21. Concurrence:
DOQA James Blaylock Date 7/11/01

DEFICIENCY/CORRECTIVE ACTION REPORT/STOP WORK ORDER CONTINUATION PAGE

Block 14, Remedial Actions, Continued

The following is a summary of the information that has been developed for the group meetings.

ITEM FOR DISCUSSION

Following the completion of the TSPA Model for Site Recommendation (MDL-WIS-PA-000002, Rev 00), several errors were found by the members of the PA group and tracked as items to address in the next revision. When the tracking list was reviewed recently, no documentation existed that demonstrated that an evaluation to determine if the errors were Conditions Adverse to Quality had been performed. Some of the errors could immediately be classified by knowledgeable individuals as having little or no effect on the results of the TSPA and were not failures to follow procedures. These items, therefore, were not Conditions Adverse to Quality. However, a number of other errors could not be classified as having little or no effect on the results of the TSPA without performing additional analyses or model runs.

As noted on Power Point slides # 5, #12, and #14 from the training on procedure AP-16.1Q *Management of Conditions Adverse to Quality*, a Condition Adverse to Quality exists not only when the error causes in unacceptable results, but also when the errors cause the quality of the product to be indeterminate.

The key point for the group meetings is the following point:

> **In the absence of a documented review that determines there is not a Condition Adverse to Quality, when significant additional work needs to be performed to determine if there is an unacceptable result, then the Quality of the product is indeterminate.**

Had the TSPA group included in their informal tracking list documentation that a review had been performed by a knowledgeable individual who's technical judgement was that the error was not a Condition Adverse to Quality, the quality of the product would not have been considered indeterminate. This would apply even though additional computer runs were performed to back-up the technical judgement.

Therefore, when errors are discovered in an issued technical document produced in accordance with procedure AP-3.10Q or AP-3.11Q that require significant additional work to demonstrate that there is not an unacceptable result, there must be a documented review to determine if a Condition Adverse to Quality exists. This review can be as simple as an e-mail to the respective Department Head (Responsible Individual as defined in procedure AP-16.1Q) identifying the condition found and a brief statement of the basis for the technical judgement for why the item is not a Condition Adverse to Quality. If such a technical judgement cannot be made without performing extensive evaluation, then the Quality of the product is indeterminate and a Condition Adverse to Quality exists. At that point, a Deficiency Report must be prepared in accordance with procedure AP-16.1Q "Management of Conditions Adverse to Quality".

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Block 20.

Partially Accept

The initial response dated June 26, 2001 is considered partially acceptable. It appears that BSC has modified the approved format in block 14a to revise the "Compliance Date' to "Completion Date". The actions taken in block 14a do appear to be related to ensuring that the process will be followed in the future as expected in 14a, however revision of the type of date does not meet the form requirement. With regard to the action, the statement provided is not verifiable and should have some form of documentation, such as an e-mail to supplement the discussion. As part of the complete response submittal, correct the type of date to "Compliance" and provide the date at which you believe the process of initiating DR/CARs will be in compliance with the program. The completion date for the discussion can be indicated as part of the response on a separate line, i.e. a completion date for the actions as well as a compliance date for the process.

William J. Glasser
QAR 7-6-01

TYPE RESPONSE:
☒ Initial
☐ Complete
☒ Amended

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DEFICIENCY/CORRECTIVE ACTION REPORT (RESPONSE)

14a. Immediate Action:

Concurrent with the preparation of DR 080, the requirement to prepare Deficiency Reports for Conditions Adverse to Quality was discussed by William Watson, Science & Analysis Integration Manager, with Jerry McNeish, TSPA Department Head and key staff. This discussion was to identify the appropriate immediate action to ensure compliance. The group meetings described in Block 14 are the immediate action determined to be appropriate. The documentation of the group meetings will allow verification of the decision by McNeish and Watson to hold group discussions.

Compliance Date: 21 July 2001

14. Remedial Actions:

No procedure changes or additional training are required as remedial actions. The remedial action for this Condition Adverse to Quality is to hold group meetings with the TSPA Department staff to discuss the issues and ensure they are understood. In addition, the decision was made to hold discussions with the managers and key members of the Science & Analysis Project who manage/plan work on technical documents (AP-3.10Q and AP-3.11Q reports). Since the Science & Analysis Project was conducting planning sessions during July for the FY02 work, an additional topic was added to the planning sessions to discuss DR 080 and the associated issues.

See Continuation Page
Completion Date: 3 August 2001

15. Extent of Condition:

Same as 26 June 2001 response.

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

Same as 26 June 2001 response.

17. Action to Preclude Recurrence:

Since Science & Analysis Project does not produce all of the technical products produced for YMP, the Action to Preclude Recurrence has been discussed by BSC senior management. The Manager of Engineering (Jim Whitcraft) has taken responsibility for development of a procedure to manage errors discovered after technical documents have been approved and released. The Complete Response will provide more details on the proposed procedure.

18. Due Date: 14 September 2001
☒ For submittal of complete response
☐ For completion of corrective action

19. Response by: William W. Watson
William W. Watson
Date 8/10//01 Phone (702) 295-5550

20. Evaluation: ☒ Accept ☐ Partially Accept ☐ Reject
QAR William J. Glasser Date 8-29-01
William J. Glasser

21. Concurrence:
DOQA James Blaylock for Date 9/6/01

Exhibit AP-16.1Q.1
Rev. 12/20/1999

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Block 14, Remedial Actions, Continued

In order to discuss the specific issues associated with Deficiency Report BSC-01-D-080 involving procedure AP-16.1Q, *Management of Conditions Adverse to Quality*, the "item for discussion" stated in the 26 June 2001 Initial Response was followed in the meetings. Although 4 members of the TSPA staff were unable to attend the TSPA group discussions, the objective of the meetings is considered to be met as the key individuals who manage, plan and conduct TSPA work were present.

Request for Extended Processing

As noted in the 26 June 2001 response to DR BSC-01-D-080, the action to bring Science and Analysis into compliance was the series of meetings described in Block 14. These have been completed.

The additional time required to finalize the procedure for management of errors discovered after a technical document has been prepared and release will not impact the quality of work. The basis for this conclusion is that the Science & Analysis management and key staff now understand that errors must be evaluated to determine if a Condition Adverse to Quality exists. If such a condition exists, deficiency reports will be written in accordance with procedure AP-16.1Q.

RWA

Robert W. Andrews

Note: Date requested falls within 100 days, so no need at this time to further process this request.
Deborah J. Opielowski
8/28/01

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Block 20 Evaluation

The initial response is considered acceptable with the following comment:

The identified action to preclude recurrence describes the intention to develop a procedure to manage errors discovered in technical documents. It is expected that this procedure will address the implementation of the Nonconformance requirements described in QARD Appendix C, *Monitored Geologic Repository*, paragraph C.2.6 Modification of QARD Section 15.0, Nonconformances. This requirement applies the nonconforming process to products. Technical reports prepared in accordance with required project procedures are considered products in the context of the Appendix C requirement.

William J. Glasser 8-29-01
William J. Glasser QAR

TYPE RESPONSE:

- [x] Initial
- [ ] Complete
- [x] Amended

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DEFICIENCY/CORRECTIVE ACTION REPORT (RESPONSE)

14a. Immediate Actions:
Same as 8/10/01 response.

Compliance Date:

14. Remedial Actions:
Same as 8/10/01 response.

15. Extent of Condition:
Same as 8/10/01 response.

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

Same as 8/10/01 response.

17. Action to Preclude Recurrence:
A complete response will be provided to detail the actions to preclude recurrence by the date indicated in block 18.

18. Due Date: October 5, 2001
- [x] For submittal of complete response
- [ ] For completion of corrective action

19. Response by: James Whitcraft
JMBK [signature]
Date 9/13/01 Phone 295-4416

20. Evaluation: [X] Accept [ ] Partially Accept [ ] Reject
William J. Glasser [signature]
QAR William J. Glasser Date 9-19-01

21. Concurrence: Subsequent Response received. DGO 10/16/01
DOQA N/A Date

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Request for Extended Processing

BSC is requesting an extension until October 5, 2001 to submit a complete response to detail the proposed action to preclude recurrence. Further discussion between BSC and the QAR is warranted before the proposed action to preclude recurrence is submitted. No adverse impacts will result from the requested extension. It is further requested that the completion date for of the implementation of the proposed action to preclude recurrence be extended to December 14, 2001.

Mary G. McDaniel 9-13-01

James S. Whitcraft, Engineering Manager 9-13-01

TYPE RESPONSE:
☐ Initial
☒ Complete
☐ Amended

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DEFICIENCY/CORRECTIVE ACTION REPORT (RESPONSE)

14a. Immediate Actions:

Same as 08/10/01 Response

Compliance Date:

14. Remedial Actions:

Same as 08/10/01 Response

15. Extent of Condition:

Same as 08/10/01 Response

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

Same as 08/10/01 Response

17. Action to Preclude Recurrence:
Existing project procedure, AP-REG-004, *CONDITION/ISSUE IDENTIFICATION AND REPORTING/RESOLUTION SYSTEM*, will be used to identify, document and disposition technical issues/errors in approved technical products. After being entered, screened, and processed through the CIRS, other project procedures, including AP-16.1Q will be used if it is determined that the issues are conditions adverse to quality. These procedural requirements will be reinforced through directive from BSC Management that all technical issues/errors in approved technical products identified by BSC will be captured and dispositioned through the CIRS process.

18. Due Date: December 15, 2001
☐ For submittal of complete response
✓ For completion of corrective action

19. Response by:
S. Swenning
Date 10/03/2001 Phone 702-295-1631

20. Evaluation: ☐ Accept ☐ Partially Accept ☒ Reject
QAR William J. Glasser William F. GLASSER Date 10/16/01

21. Concurrence:
DOQA for B. Blaylock Date 10/17/01

Exhibit AP-16.1Q.1 Rev. 12/20/1999

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REQUEST FOR EXTENDED PROCESSING

Extended Actions: (Identify those corrective actions planned for completion beyond 100 days from issuance of the deficiency)

Existing project procedure, AP-REG-004, *CONDITION/ISSUE IDENTIFICATION AND REPORTING/RESOLUTION SYSTEM*, will be used to identify, document and disposition technical issues/errors in approved technical products. After being entered, screened, and processed through the CIRS, other project procedures, including AP-16.1Q will be used if it is determined that the issues are conditions adverse to quality. These procedural requirements will be reinforced through directive from BSC Management that all technical issues/errors in approved technical products identified by BSC will be captured and dispositioned through the CIRS process.

These ongoing actions, as well as the use of the quality observation process within the AP-16.1Q revision, will be used to capture and disposition technical issues/errors. The expected completion date of December 14, 2001 will allow the project to evaluate and determine the effectiveness of this approach prior to verification and closure of the deficiency.

Expected Completion Date: December 14, 2001

Justification: (Provide an explanation as to why the required actions can not be completed within 100 days)

The deficiency has been open for 123 days as of October 8, 2001. The Chief Science Office was assigned responsibility for the deficiency after the 100 days had elapsed. The deficiency was originally assigned to the Projects organization. Further examination revealed that the issue could be addressed more completely within the functional organizations responsible for process development. Discussions between Engineering and Science placed responsible within the Science organization, as the issues contemplated would generally occur within the science-related projects. The complexity of the deficiency resulted in extensive discussions and interface with Projects, Engineering, BSC QA and with the NQS staff assigned as the QAR to determine the most effective actions to preclude recurrence. In addition, project procedure AP-16.1Q is being revised to address quality observations. This procedure was available for review on October 4, 2001. The use of the CIRS and the revised AP-16.1Q made development of a new procedure unnecessary, however this information was not known within the initial 100 days of the issuance of the deficiency.

Impact: (Provide an impact statement to indicate what affect not completing within 100 days will have relative to waste isolation and safety, and impact on other work, if any)

Extending the completion date for this deficiency past the existing 123 days will not impact work relative to waste isolation and safety. This impact determination is based on the following: Project personnel directly involved in the deficiency have been advised to use existing processes in identifying technical issues/errors. The action to preclude recurrence will use existing project processes (CIRS) reinforced within BSC with a message from management that CIRS will be used as the method for issue identification, supported by other project procedures, including AP-16.1Q. Proposed revisions for AP-16.1Q further support this use through the identification of quality observations and the use of CIRS for those issues that do not rise to the level of minor conditions adverse to quality.

There is no impact on existing or new work, as the action to preclude recurrence requires the use of existing project procedures to address technical issues/errors.

Approvals

Responsible Individual:			Senior Management:		
S. Swenning	[signature]	10/08/01	M. Voegele	for	10-8-01
Printed Name	Signature	Date	Printed Name	Signature	Date
DOE Project Management:			Director, OQA:		
Printed Name	Signature	Date	Printed Name	Signature	Date

Director, OCRWM (required for scheduled completion dates one year or more from initial issue)

NA	NA	NA
Lake Barrett (Act)	Signature	Date

Exhibit AP-16.1Q.2 Rev. 06/01/99

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Block 20 Evaluation

The 10/3/01 response and defined action to preclude recurrence are not acceptable.

The initial response dated June 26, 2001 acknowledged a recommendation #2 to consider a separate process for managing technical issues. That response included consideration of CIRS at that time as a possible action and a statement that the conclusion of the review will be documented in the Complete Response. An Initial Amended response was received dated 8/10/01 that the Manager of Engineering intended to develop a procedure to manage errors discovered after technical documents have been approved and released. This response was accepted with a comment that it was expected that this process would address the Nonconformance requirements describe in QARD Appendix C. These requirements and implementation documents are as follows:

AP-16.1Q, Rev 4, ICN 1 *Management of Conditions Adverse to Quality*

Deficiency–A CAQ concerning an activity, attribute, documentation, or procedure that renders the quality of an activity unacceptable or indeterminate.

QARD Appendix C, *Monitored Geologic Repository, paragraph* C.2.6 Modification of QARD Section 15.0, Nonconformances

Nonconforming products resulting from activities specified in work controlling documents (such as job packages or work requests) shall be documented , evaluated, identified, segregated, and dispositioned in accordance with Section 15.0, Nonconformances, of this QARD.

AP-15.2Q/Rev. 0/ICN 1 *Control of Nonconformances*

3.11 ***Nonconformance***–A deficiency in characteristic or record that renders the quality of an item or sample unacceptable or indeterminate (QARD). For the purposes of this procedure, products also are included.

3.13 ***Products***–Records/reports that result from scientific investigation activities that are used or are intended for use in site characterization, facility permitting/licensing, or facility construction/operations. Products consist primarily of record/report data gathered from observations or studies and include, but are not limited to, meteorological data, geologic testing results, and geologic mapping.

(Continued)

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Block 20 Evaluation (continued)

From the above requirements, deficiencies are relative to activities. The nonconformance controls are related to items and, in the case of QARD Appendix C work, has been extended to include products. The product definition provided above was the basis for providing the comment in response to the 8/10/01 response. The current Complete Response dated 10/3/01 fails to either address that comment or provide an alternate process that does. Neither the commitment to CIRS as the process nor the reference to the impending Quality Observation process currently being evaluated by the project meets the above requirements.

BSC is requested to provide a revised response that explains why the currently approved project requirements and procedures are not being implemented. The revised response must include a revised request for extended processing since the basis provided in the current request is consistent with the current response and is, therefore, unacceptable.

QAR William J. Glasser Date 10-16-01
William J. Glasser

DOE OQA James Blaylock for Date 10/16/01

DOE OPE [signature] Date 10/16/01

TYPE RESPONSE:
☐ Initial
☒ Complete
☒ Amended

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DEFICIENCY/CORRECTIVE ACTION REPORT (RESPONSE)

14a. Immediate Actions:

Same as 08/10/01 Response

Compliance Date:

14. Remedial Actions:

The original technical errors that formed the basis for this deficiency should have been documented in accordance with the current Appendix C process, AP-15.2Q. These TSPA errors, along with all open technical errors related to TSPA will be documented in accordance with AP-15.2Q. Project personnel who have identified technical errors in approved products will translate management of those errors to NCRs. One NCR for each technical product will document multiple technical errors for that product. These actions will include other CIRS items and other technical errors that are not documented in accordance with AP-15.2Q. These actions are derived from direction of the Director, OQA (R. Davis to B. Glasser 11/01/01, "OQA Interpretation Regarding Errors in Completed Products") and further clarification from OQA staff (J. Blaylock to S. Swenning, 11/05/01, "Escalation meeting DR-80"). (attached)

15. Extent of Condition:

The extent of condition applies to all project personnel, including National Laboratories and the U.S. Geological Survey.

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

The cause of the conditions was unclear interpretation of the QARD related to conditions adverse to quality and nonconformances as implemented in AP-16.1Q and AP-15.2Q. This interpretation was clarified by direction of the Director, OQA (R. Davis to B. Glasser 11/01/01, "OQA Interpretation Regarding Errors in Completed Products") and further clarification from OQA staff (J. Blaylock to S. Swenning, 11/05/01, "Escalation meeting DR-80"). (attached)

17. Action to Preclude Recurrence:

The following direction will be provided to project personnel. This communication will be made from BSC Senior Management for BSC activities, including the National Laboratories and USGS.

"For documents that have been prepared and approved in accordance with the quality assurance program, any technical errors that are identified shall render the quality of that document immediately indeterminate. These errors shall initially be identified, evaluated, and dispositioned in accordance with approved project procedures that implement QARD Appendix C, *Monitored Geologic Repository*, paragraph C.2.6 Modification of QARD Section 15.0, Nonconformances. The current procedure to meet these requirements is AP-15.2Q/Rev.0/ICN1 *Control of Nonconformances*. Project personnel who have identified technical errors in approved products will translate management of those errors to NCRs."

18. Due Date: January 10, 2002
☐ For submittal of complete response
✓ For completion of corrective action

19. Response by:
S. Swenning
RPR
Date 11/07/2001 Phone 702-295-5184

20. Evaluation: ☒ Accept ☐ Partially Accept ☐ Reject
QAR William J. Glasser William J. Glasser Date 11/19/01

21. Concurrence:
DOQA James Blaylock for Date 11/19/01

Exhibit AP-16.1Q.1 Rev. 12/20/1999

Steven Swenning 11/20/2001 01:12 PM

To: Deborah Opielowski/YD/RWDOE@CRWMS
cc: Bill Glasser/YD/RWDOE@CRWMS, James Blaylock/YD/RWDOE@CRWMS, Robert Davis/YD/RWDOE@CRWMS, Robb Keele/YM/RWDOE@CRWMS

Subject: BSC-01-D-080

QA:QA Inclusionary

Deborah,

Please include this email as an attachment to DR-80. As indicated in the November 7, 2001 amended complete response, this direction forms the basis for the response provided...These e-mails were provided with the hardcopy response, but appear to have been misplaced.

thanks

shs

James Blaylock
11/05/2001 12:55 PM

To: Steven Swenning/YM/RWDOE@CRWMS
cc: Bill Glasser/YD/RWDOE@CRWMS, Robert Davis/YD/RWDOE@CRWMS

Subject: Escalation meeting DR-080

Not A Federal Record

Steve,

Bill Glasser and I have discussed the proposed response with Bob Davis. The actions to preclude recurrence appear to be recognizing the decision from the escalation meeting as it applies to Science and Analysis Project Staff. The decision made is a generic application that needs to be communicated to ALL project personnel, not just Science and Analysis. This communication needs to be made from the Senior Management level for all of BSC activities, including the Labs and USGS.

With the redirection to recognize Appendix C of the QARD, it is expected that a revised remedial actions will recognize that the original issue should have been documented in accordance with the current Appendix C process, AP-15.2Q. The TSPA issues that formed the basis for the DR along with all open technical error issues related to TSPA must be moved from CIRS to the recognized "Q" process, i.e. NCR the CIRS TSPA technical errors.

The above actions are deemed necessary to bring DR-80 to closure. Communication of the expected process to manage errors must include a direction that all project personnel who have issues that meet the escalation decision should translate management of those issues to NCRs. One NCR for each technical product could document multiple technical errors for that product. (This would include other CIRS items and issues that are not documented anywhere else). Completion of these additional actions would not hold up closure of the DR. OQA will assess products and errors identified and confirm through future reviews if this expectation was implemented.

---------- Forwarded by Steven Swenning/YM/RWDOE on 11/20/2001 01:01 PM ----------

Robert Davis
11/01/2001 04:01 PM

To: Bill Glasser/YD/RWDOE@CRWMS
cc: Nancy Williams/YM/RWDOE@CRWMS, Dick Spence/YD/RWDOE@CRWMS, James Blaylock/YD/RWDOE@CRWMS, Don Krisha/YM/RWDOE@CRWMS, Robb Keele/YM/RWDOE@CRWMS, Steven Swenning/YM/RWDOE@CRWMS, Robert Hasson/YD/RWDOE@CRWMS, Don Horton/YD/RWDOE@CRWMS, Ken Hess/YM/RWDOE@CRWMS, Carl Weber/HQ/RWDOE@CRWMS, Elena Angeles/YD/RWDOE@CRWMS, Debra Mumford/YD/RWDOE@CRWMS, Mike Ruiz/YD/RWDOE@CRWMS, David Howell/YD/RWDOE@CRWMS, Harry White/YD/RWDOE@CRWMS, Albert Williams/YD/RWDOE@CRWMS, Mario Diaz/YD/RWDOE@CRWMS, James Blaylock/YD/RWDOE@CRWMS, Ram Murthy/YD/RWDOE@CRWMS

Subject: OQA Interpretation Regarding Errors in Completed Products

QA:QA Inclusionary

Thanks, Bill, for summarizing the outcome of yesterday's escalation meeting.

Note to all addressees-- Please read and understand the below QA interpretation (scroll down to the bold print paragraph). Please feel free to call with questions.

Bob Davis
Acting Director, OQA

Bill Glasser

Bill Glasser
11/01/2001 03:23 PM

To: Robert Davis/YD/RWDOE@CRWMS
cc: James Blaylock/YD/RWDOE@CRWMS

Subject: Results of DR-80 escalation meeting (Revised to correct Typo errors)

QA:N/A Exclusionary

Based on the discussions in yesterday's meetings, the following is suggested for content in an e-mail to document decisions made:

Subject: Escalation meeting concerning BSC-01-D-080

Background

As a result of errors identified in the TSPA Model Report after approval and release of this document, deficiency BSC-01-D-080 was initiated for failure to initiate a DR/CAR to recognize that the quality of the report was indeterminate during the evaluation of the errors. One of the recommended actions proposed the development of a process (procedure controls) to manage errors discovered after a technical document has been approved and released. BSC's initial response, dated 6/26/01, stated that one method under consideration was the use of the Condition/Issue Identification and Reporting/Resolution system (CIRS). A subsequent amended response, dated 8/10/01, stated that a procedure would be developed to manage errors discovered after technical documents had been approved and released. That commitment was accepted by OQA with comment that the procedure would be consistent with the implementation of QARD Appendix C, *Monitored Geologic Repository*, paragraph C.2.6 Modification of QARD Section 15.0, Nonconformances. BSC's complete response dated 10/3/01 reversed the accepted, amended response dated 8/10/01 by stating that CIRS would be used to identify, document and disposition technical issues/errors in approved technical documents. OQA subsequently rejected these

actions as not meeting either QARD Appendix C requirements or approved implementing project procedures, i.e. AP-15.2Q/Rev.0/ICN1 *Control of Nonconformances.* Since BSC management was in disagreement with the rejection of their response, an escalation meeting was requested to determine required actions.

Actions

On October 31, 2001, an escalation meeting was held to discuss DOE's requirement for managing technical errors that are discovered in technical documents after approval and issuance. These are documents prepared, approved, and issued in accordance with the Quality Assurance Requirements and Description document, DOE/RW-0333P. The following project personnel attended this meeting:

Robert Davis	Acting Director, Office of Quality Assurance
Richard Spence	Deputy Manager, Office of Project Execution
James Blaylock	Verification Lead, Office of Quality Assurance
Donald Krisha	Manager of Quality Assurance, BSC
Robert Keele	Quality Engineering Manager, BSC
Steven Swenning	Responsible BSC Manager for BSC-01-D-080
Robert Hasson	Verification Manager, NQS
William Glasser	QAR for BSC-01-D-080, NQS

Based on discussion of the requirements from this meeting, the DOE Acting Director of Quality Assurance provided the following direction:

Technical documents are products to which the referenced Appendix C requirements apply.

Consequently for documents that have been prepared, approved, and issued in accordance with the quality assurance program, any technical errors that are identified shall render the quality of that document immediately indeterminant. These errors shall initially be identified, evaluated, and dispositioned in accordance with approved project procedures that implement QARD Appendix C, *Monitored Geologic Repository*, paragraph C.2.6 Modification of QARD Section 15.0, Nonconformances. The current procedure to meet these requirements is AP-15.2Q/Rev.0/ICN1 *Control of Nonconformances.*

Based on the above direction, BSC is expected to provide a response consistent with this decision.

OFFICE OF CIVILIAN
RADIOACTIVE WASTE MANAGEMENT
U.S. DEPARTMENT OF ENERGY
WASHINGTON, D.C.

8. ☐ DR/CAR
☐ Stop Work Order

NO. BSC-01-D-080

PAGE OF

QA: QA

DEFICIENCY/CORRECTIVE ACTION REPORT/STOP WORK ORDER CONTINUATION PAGE

REQUEST FOR EXTENDED PROCESSING

Note: This is an amended Request for Processing to revise and replace, in its entirety the request dated 10/08/01.

Extended Actions: (Identify those corrective actions planned for completion beyond 100 days from issuance of the deficiency)

The review of existing processes, and submittal of the complete amended response exceeded 100 days. The corrective actions exceeding 100 days are the amended remedial actions and actions to preclude recurrence presented in the Amended Complete Response.

Expected Completion Date: January 10, 2002

Justification: (Provide an explanation as to why the required actions can not be completed within 100 days)

The deficiency has been open for 153 days as of November 7, 2001. The Chief Science Office was assigned responsibility for the deficiency after the 100 days had elapsed. The deficiency was originally assigned to the Projects organization. Further examination revealed that the issue could be addressed more completely within the functional organizations responsible for process development. Discussions between Engineering and Science placed responsibility within the Science organization, as the issues contemplated would generally occur within the science-related projects. The complexity of the deficiency resulted in extensive discussions and interface with BSC Projects, Engineering and QA and with DOE Office of Project Execution, Office of Quality Assurance and the NQS staff assigned as the QAR to determine the most effective actions to preclude recurrence. An escalation meeting was completed on October 31, 2001 Reference e-mail Robert Davis to Bill Glasser 11/01/01 04:01 PM "OQA Interpretation Regarding Errors in Completed Products" and e-mail James Blaylock to Steven Swenning 11/05/01 12:55 PM, "Escalation meeting DR-80" that form the basis of the response provided. (attached)

Impact: (Provide an impact statement to indicate what affect not completing within 100 days will have relative to waste isolation and safety, and impact on other work, if any)

Extending the completion date for this deficiency past 100 days will not impact work relative to waste isolation and safety. This impact determination is based on the following: Project personnel directly involved in the deficiency have been advised to use the existing deficiency process in identifying technical errors. The action to preclude recurrence directs use of another existing project procedure, AP-15.2Q that contain the same identification attributes but does not require process-related corrective actions.

There is no impact on completed, existing or new work, as the action to preclude recurrence requires the use of the existing project procedure, AP-15.2Q, to address technical errors.

Approvals

Responsible Individual:			Senior Management:		
_S. Swenning___		11/8/01 RPR			11-8-01
Printed Name	Signature	Date	Printed Name	Signature	Date
DOE Project Management:			Director, OQA:		
Printed Name	Signature	Date	Printed Name	Signature	Date

Director, OCRWM (required for scheduled completion dates one year or more from initial issue)

NA	NA	
Lake Barrett (Act)	Signature	Date

Exhibit AP-16.1Q.2 Rev. 06/01/99

TYPE RESPONSE:
☐ Initial
☒ Complete
☒ Amended

OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
U.S. DEPARTMENT OF ENERGY
WASHINGTON, D.C.

DR/CAR NO. BSC-01-D-080
PAGE 2 OF

QA: QA

DEFICIENCY/CORRECTIVE ACTION REPORT (RESPONSE)

This response replaces the response of November 7, 2001 in its entirety.

14a. Immediate Actions:

Same as 08/10/01 Response

Compliance Date:

14. Remedial Actions:

Upon approval of AP-15.3Q (see block 17) technical errors in approved technical products will be documented in accordance with this procedure. Technical errors that are documented in deficiency reports in accordance with AP-16.1Q or that may require actions in accordance with the approved response of an existing deficiency report will continue to be managed to closure in accordance with AP-16.1Q. If process issues have been resolved, technical errors may be documented in accordance with AP-15.3Q to allow for closure of deficiency reports.

Closure of other deficiency reports containing technical errors and closure of Technical Error Reports are not a part of the actions of this deficiency report.

15. Extent of Condition:

The extent of condition applies to BSC technical products. A composite listing of technical documents with known technical errors will be maintained and submitted as an amended response to this DR upon implementation of AP 15.3Q. These technical errors identified in approved technical products prior to the implementation of AP-15.3Q, will be added to the extent of condition for this DR.

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

The cause of the condition was unclear understanding of the requirement of QARD Appendix C.2.6 and the need to document technical errors in accordance with project procedures. Previous technical errors have been documented in accordance with AP-16.1Q.

17. Action to Preclude Recurrence:

Project procedure AP-15.3Q (DAR #1327) is being developed to document technical errors in approved technical products.

18. Due Date: January 30, 2002
☐ For submittal of complete response
✓ For completion of corrective action

19. Response by:
S. Swenning
Date 11/26/2001 Phone 702-295-5184
12/4/01

20. Evaluation: ☒ Accept ☐ Partially Accept ☐ Reject
QAR William J. Glasser Date 12/05/01

21. Concurrence:
DOQA James Blaylock Date 12/6/01

Exhibit AP-16.1Q.1

Rev. 12/20/1999

OFFICE OF CIVILIAN
RADIOACTIVE WASTE MANAGEMENT
U.S. DEPARTMENT OF ENERGY
WASHINGTON, D.C.

8. ☐ DR/CAR
☐ Stop Work Order

NO BSC-01-D-080

PAGE OF

QA: QA

DEFICIENCY/CORRECTIVE ACTION REPORT/STOP WORK ORDER CONTINUATION PAGE

REQUEST FOR EXTENDED PROCESSING

Note: This is an amended Request for Processing to revise and replace, in its entirety the request dated 11/08/01.

Extended Actions: (Identify those corrective actions planned for completion beyond 100 days from issuance of the deficiency)

The review of existing processes, and submittal of the complete amended response exceeded 100 days. The corrective actions exceeding 100 days are the amended remedial actions and actions to preclude recurrence presented in the Amended Complete Response.

Expected Completion Date: January 30, 2002

Justification: (Provide an explanation as to why the required actions can not be completed within 100 days)

The deficiency has been open for 173 days as of November 27, 2001. The Chief Science Office was assigned responsibility for the deficiency after the 100 days had elapsed. The deficiency was originally assigned to the Projects organization. Further examination revealed that the issue could be addressed more completely within the functional organizations responsible for process development. Discussions between Engineering and Science placed responsibility within the Science organization, as the issues contemplated would generally occur within the science-related projects. The complexity of the deficiency resulted in extensive discussions and interface with BSC Projects, Engineering and QA and with DOE Office of Project Execution, Office of Quality Assurance and the NQS staff assigned as the QAR to determine the most effective actions to preclude recurrence

Impact: (Provide an impact statement to indicate what affect not completing within 100 days will have relative to waste isolation and safety, and impact on other work, if any)

Extending the completion date for this deficiency past 100 days will not impact work relative to waste isolation and safety. This impact determination is based on the following: Project personnel directly involved in the deficiency have been advised to use the existing deficiency process in identifying technical errors.

Approvals

Responsible Individual:			Senior Management:		
_S. Swenning____		11/27/01	K. C. WEISS		12/3/01
Printed Name	Signature	Date	Printed Name	Signature	Date
DOE Project Management:			Director, OQA:		
D.G. HORTON		12/13/01	R. DAVIS		12/10/01
Printed Name	Signature	Date	Printed Name	Signature	Date

Director, OCRWM (required for scheduled completion dates one year or more from initial issue)

NA	NA	
Lake Barrett (Act)	Signature	Date

Exhibit AP-16.1Q.2 Rev. 06/01/99

TYPE RESPONSE:
☐ Initial
☒ Complete
☒ Amended

OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT U.S. DEPARTMENT OF ENERGY WASHINGTON, D.C.

DR/CAR NO. BSC-01-D-080
PAGE 2 OF

QA: QA

DEFICIENCY/CORRECTIVE ACTION REPORT (RESPONSE)

14a. Immediate Actions:

Same as 08/10/01 Response

Compliance Date:

14. Remedial Actions:

Technical errors in approved technical products have been documented in accordance with AP-15.3Q. (see block 17)

Closure of other deficiency reports containing technical errors and closure of Technical Error Reports are not a part of the actions of this deficiency report.

15. Extent of Condition:

The extent of condition applies to BSC technical products. A composite listing of technical documents with known technical errors is attached.

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

11/26/01 DGO 4/23/02 (change is per e-mail dated 3/19/02) DGO

Same as ~~12/04/01~~ response.

17. Action to Preclude Recurrence:

Project procedure AP-15.3Q has been implemented to document technical errors in approved technical products.

18. Due Date: March 6, 2002
☐ For submittal of complete response
✓ For completion of corrective action

19. Response by:
S. Swenning
BSCQA 3/6/02
Date 03/06/2002 Phone 702-295-5184

20. Evaluation: ☒ Accept ☐ Partially Accept, ☐ Reject NOT SIGNIFICANT
QAR William J. Glasser William J. Glasser Date 4/8/02

21. Concurrence:
RAM MURTHY James B Leyforkp
DOQA Date 4/10/02

Exhibit AP-16.1Q.1 Rev. 12/20/1999

BSC-01-D-080 ERRATA LIST

ITEM #	DR #	TITLE	ID #	ERRATA	TER #
1	BSC-01-D-142	Abstraction of BDCF Distributions for Irrigation Periods	ANL-NBS-MD-000007 REV 00 ICN 01 (B0075)	1) The source DTN provided at the bottom of Tables 1, 2, and 3, on pages 10, 11, and 12 respectively (DTN: MO00010SPAABS08.008) is not correct. A user can not access the data in the TDMS with the DTN provided for the tables.	TER-02-0001
1	BSC-01-D-142	Abstraction of BDCF Distributions for Irrigation Periods	ANL-NBS-MD-000007 REV 00 ICN 01 (B0075)	2) The source DTN provided at the bottom of Table 4 is incorrect. DTN SN9912T0512299.003 does not appear to exist in the TDMS. Possible correct DTNs include SN9912T0512299.001, which does contain information on soil leaching rates, and SN0002T0512299.003, which superseded it. It was not clear (given the date of the superseding DTN and the date of the AMR) which is the correct DTN.	TER-02-0001
1	BSC-01-D-142	Abstraction of BDCF Distributions for Irrigation Periods	ANL-NBS-MD-000007 REV 00 ICN 01 (B0075)	3) The first sentence of the "CONCLUSION" section on page II-9 states --- "As further evidence that the integrated routine functions as expected is provided by Table II-3, in Section 6.4. There are no tables at all in section 6.4, only one figure. All the tables labeled "II-number" are in attachment II, not in the body of the AMR. Based on the text in the "conclusion" section it appears that the correct reference may be Table 5 in section 6.5.	TER-02-0001
2	BSC-01-D-142	Distribution Fitting to the Stochastic BDCF Data	ANL-NBS-MD-000008 REV 00 ICN 01 (B0080)	1) On page II-3, just after Table II-1, it should be stated that there are 10 bins with 15 (not 13) data points each, in order to be consistent with the AMR text on page 23.	TER-02-0002
2	BSC-01-D-142	Distribution Fitting to the Stochastic BDCF Data	ANL-NBS-MD-000008 REV 00 ICN 01 (B0080)	2) At the bottom of page II-3 the data range should be E4:E153, not E133 as it now reads.	TER-02-0002
2	BSC-01-D-142	Distribution Fitting to the Stochastic BDCF Data	ANL-NBS-MD-000008 REV 00 ICN 01 (B0080)	3) At the top of page II-4, the second distribution is referenced to block G27:H37, but the third distribution (normal) is not referenced at all. The block G46:H56 should be indicated.	TER-02-0002
2	BSC-01-D-142	Distribution Fitting to the Stochastic BDCF Data	ANL-NBS-MD-000008 REV 00 ICN 01 (B0080)	4) The 3rd short paragraph on page II-4 indicates that cell J1 contains a mathematical expression, however cell J1 on Table II-2 is blank.	TER-02-0002
2	BSC-01-D-142	Distribution Fitting to the Stochastic BDCF Data	ANL-NBS-MD-000008 REV 00 ICN 01 (B0080)	5) The 4th paragraph on page II-4 cross references to a discussion of "distribution screening" in Section 6.2.1.5, and states that two distributions (lognormal and shifted lognormal) will be considered. Section 6.2.1.5 does not exist. There is a discussion of "distribution fitting" in section 6.2.6 which states that three distributions will be considered (normal, lognormal, and shifted lognormal).	TER-02-0002
2	BSC-01-D-142	Distribution Fitting to the Stochastic BDCF Data	ANL-NBS-MD-000008 REV 00 ICN 01 (B0080)	6) In the 4th paragraph, 3rd line, the block of cells I4:K20 should be J4:K20.	TER-02-0002
2	BSC-01-D-142	Distribution Fitting to the	ANL-NBS-MD-000008	7) On page II-5, under "Optimization", step 3, cells K3:K5	TER-02-0002

BSC-01-D-080 ERRATA LIST

ITEM #	DR #	TITLE	ID #	ERRATA	TER #
		Stochastic BDCF Data	REV 00 ICN 01 (B0080)	should be J3:J5. Also the normal distribution cells J43:J44 should be added.	TER-02-0002
2	BSC-01-D-142	Distribution Fitting to the Stochastic BDCF Data	ANL-NBS-MD-000008 REV 00 ICN 01 (B0080)	8) On page II-6, the 4th paragraph, discusses 150 random samples of a lognormal distribution and Table II-4 is referenced. Table II-4 is for a shifted lognormal test.	TER-02-0002
2	BSC-01-D-142	Distribution Fitting to the Stochastic BDCF Data	ANL-NBS-MD-000008 REV 00 ICN 01 (B0080)	9) The last paragraph on page II-6 discusses 2 distributions (not all three) and states that "As expected, both distributions provide acceptable fits to the random data (Section 6.1.3)". In sections 6.1.3 and 6.2.6, the accept/reject cutoff for chi squared is 12 for the normal and lognormal distributions and 10.6 for the shifted lognormal distribution. Looking at the chi squared values in table II-5 it appears that only the shifted lognormal distribution with a value of 9.1604 is acceptable. The other 2 chi squared values are 14.6770 (lognormal), and 25.0131 (normal). The conclusion has to change to state that only the shifted lognormal distribution provides an acceptable fit.	TER-02-0002
2	BSC-01-D-142	Distribution Fitting to the Stochastic BDCF Data	ANL-NBS-MD-000008 REV 00 ICN 01 (B0080)	10) In the same paragraph discussed in 9 above, a shift of 0.32 is noted. The shift on Table II-5 is actually 4.9968.	TER-02-0002
2	BSC-01-D-142	Distribution Fitting to the Stochastic BDCF Data	ANL-NBS-MD-000008 REV 00 ICN 01 (B0080)	11) On page II-7, only 2 distributions are mentioned, the normal distribution is missing form the discussion.	TER-02-0002
2	BSC-01-D-142	Distribution Fitting to the Stochastic BDCF Data	ANL-NBS-MD-000008 REV 00 ICN 01 (B0080)	12) On page IV-2, 2nd to the last line of the 1st paragraph, B4:B154 should be B4:B153.	TER-02-0002
3	BSC-01-D-142	Water Drainage Model	ANL-EBS-MD-000029 REV 00 ICN 01 (E0070)	1) The reference in attachment II to the source code listing for chim_wt_TP.f (attachment VI) is incorrect. The routine chim_wt_TP.f is not listed in attachment VI.	TER-02-0003
3	BSC-01-D-142	Water Drainage Model	ANL-EBS-MD-000029 REV 00 ICN 01 (E0070)	2) Essentially all of the cross-references to figures in the AMR are incorrect. There are two "Figure 1" figures. The first is on pages 13 and 14, and the second is on page 29. The numerous figure references on pages 25, 26, 31, 32 (in Table 7), and 36 are all incorrect.	TER-02-0003
3	BSC-01-D-142	Water Drainage Model	ANL-EBS-MD-000029 REV 00 ICN 01 (E0070)	3) On Table III-1, the Northing and Easting coordinates are reversed.	TER-02-0003
4	BSC-01-D-142	EBS: Physical & Chemical Environment Model	ANL-EBS-MD-000033 REV 01 (E0100)	1) Table 3-1, the first routine listed has an incorrect name, there should be a "12" after Sd.	TER-02-0004
4	BSC-01-D-142	EBS: Physical & Chemical Environment Model	ANL-EBS-MD-000033 REV 01 (E0100)	2) Page 22, first line, "Attachment IV" should be "Attachment II".	TER-02-0004
4	BSC-01-D-142	EBS: Physical & Chemical Environment Model	ANL-EBS-MD-000033 REV 01 (E0100)	3) Page II-1, section II.3.1, a DTN is referenced for the "Groundwater Flow Model (GFM) V3.0". The DTN referenced is in support of the Geologic Framework Model V3.0.	TER-02-0004

BSC-01-D-080 ERRATA LIST

ITEM #	DR #	TITLE	ID #	ERRATA	TER #
4	BSC-01-D-142	EBS: Physical & Chemical Environment Model	ANL-EBS-MD-000033 REV 01 (E0100)	4) Page III-2, second line, "tree" should be "three", and line 6, "as positive" should be "is positive".	TER-02-0004
4	BSC-01-D-142	EBS: Physical & Chemical Environment Model	ANL-EBS-MD-000033 REV 01 (E0100)	5) Page IX-1, the use of "routines" (plural) appears to be incorrect since the attachment only discusses one routine.	TER-02-0004
4	BSC-01-D-051	EBS: Physical & Chemical Environment Model	ANL-EBS-MD-000033 REV 01 (E0100)	**The references that we can add to the list for the P&CE AMR are DR BSC-01-D-051 and an email from David Sassani to James Blink, et all dated 03/29/2001 the accession number for the email is MOL.20010625.0013.	TER-02-0004
4	BSC-01-D-051	EBS: Physical & Chemical Environment Model	ANL-EBS-MD-000033 REV 01 (E0100)	1) Contrary to the cited requirements 1,3 and 4, Section 3.5.1, page 25, 1st paragraph, second sentence. There are specific water composition results referred to, but there is no citation provided to identify the source. The Table 4-5 that is mentioned below the listing of the routine contains the water compositions and correctly cites the source as CRWMS M&O 2000y. However, the routine description given in Attachment IV incorrectly attributes the source as CRWMS M&O 2000n.	TER-02-0004
4	BSC-01-D-051	EBS: Physical & Chemical Environment Model	ANL-EBS-MD-000033 REV 01 (E0100)	2) Contrary to the cited requirements 1, 2A, 2D3, 3, and 4, Sections 5.3.1, 5.3.2, and 5.3.3, all, Table 5-1, and Table 6.3-1, it was found that the Table 5-1 had erroneous data in it for the resultant assumed cement mineral assemblage for the model and was in conflict with the same information portrayed in Table 6.3-1. The discussion with the preparer indicated Table 5-1 was not actually supposed to be in this revision to the document. A "fixed" Table 5-1 was generated but that also was found to have some discrepancies remaining. Specifically, the "Thermally Aged Cement" column has an incorrect valued of 8.1 mole% for Brucite (should be 0 mole%); the Molecular Weight of CSH gel is not the same as in Table 6.3-1 (122.02 vs. 118.18 g/mole); and the "Notes A and B" and inaccurate - none of the values listed are from the referenced sources, they are calculated in this AMR based on other values in those cited tables. This inaccurate source referencing is also mistakenly applied in Table 6.3-1 is actually inaccurate as discussed in another apparent deficiency below.	TER-02-0004
4	BSC-01-D-051	EBS: Physical & Chemical Environment Model	ANL-EBS-MD-000033 REV 01 (E0100)	3) Contrary to the cited requirements 1, 2A, 2D3, 2D5, 3, and 4, Section 5.5.1, first paragraph, Sections 6.5.3 through 6.5.5, the laboratory tests that are used as the basis for the assumption given in Section 5.5.1 are not directly identified, nor is a source document cited. The preparer indicated the source reference for the tests should be cited here, but also indicated it was provided in Section 6.5.3. Section 6.5.3	TER-02-0004

ITEM #	DR #	TITLE	ID #	ERRATA	TER #
				discusses the test results but also lacks any cited source of the information. Although this section refers to Table 6.5-1 through 6.5-7 that have DTN for the data contained in them, there still is no reference to the source documentation. Sections 6.5.4 and 6.5.5 also have these same issues regarding citation of source documentation for the testing data. The source documents are cited in Section 6.5.2, as well as, in other assumptions in Section 5.5. The preparer indicated that these should be added to these other discussions.	
4	BSC-01-D-051	EBS: Physical & Chemical Environment Model	ANL-EBS-MD-000033 REV 01 (E0100)	4) Contrary to the cited requirements 1, 2A, 2D3, 3, and 4, the calculations associated with Table 5-3-1 were found to be incorrect. Specifically: The values for young cement in Table 6.3-1 were calculated (as shown in spreadsheet file "table5-1.xls" in Att.1) using the absolute numbers of moles of the phases given in Table 7-2 and 7-3 with the molecular weights shown in Table 6.3-1. However, because the values provided in the Tables 7-2 and 7-3 are calculated moles based on masses and molecular weights, those same molecular weights must be used to conserve mass. The molecular weight of CSH gel used for Table 6.3-1 is almost 40 percent larger than the correct value. The value used for Hydrogamet (Al + Fe) is harder to evaluate because the end-member phases in Table 7-2 have been combined. The correct values for the molecular weight of the combined mineral is about 400.8 g/mole compared to the value of 390.39 g/mole used for Table 6.3-1. In addition, there is an additional amount of CSH gel (1792 moles) portandite (3 x 1792 moles) that were used to form it. This latter represents a large change to the 1066 moles of portlandite represented in Table 6.3-1 for young cement. The degree to which this additional mass should be included as CSH gel versus portlandite depends on the relative masses of portlandite cement and silica fume in the current design grout (see Assumption 5.3.13 in the AMR) compared to those values for the grout utilized in the referenced Table 7-2. There are similar problems within the thermally aged portion of the Table 6.3-1 where there are differences in the molecular weight for Ettringite (few percent), Tobermorite (few percent) and Gehlenite hydrate (over 10 percent). Although not as large as for the young cement mineralogy, these inaccuracies indicate that the values being	TER-02-0004

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				used in Table 7-2 and 7-3 were not fully understood. Finally, the representation of the cement mineralogies in Tables 7-2 and 7-3 of the source information are for Type V cement (page 7-7 of Hardin et al., 1998) not for the Type K cement cited for the current design grout (see Assumption 5.3.13 in the AMR).	
4	BSC-01-C-001	EBS Physical and Chemical Environment Model	ANL-EBS-MD-000033 Rev. 01 (E0100)	Bin 2 **Gas Flux and Fugacity Model** Bin 3 **Cement Grout Model** Bin 3 **Corrosion of Steel Used in the Ex-Container EBS** Bin 3 **Effect of Evaporation in the Invert** Bin 3 **EBS Colloids Model** Bin 2 **Normative Precipitates/Salts Model**	TER-02-0004
5	BSC-01-D-142	Abstraction of NFE Thermodynamic Env & Perc Flux	ANL-EBS-HS-000003 REV 00 ICN 02 (E0130)	1) Page II-1, in the code listing, under "Nomenclature for this processor", the line starting "temp (8)", 3emps should be Temps. In the same section, the last entry in the line starting "time23" should be 22.64 meters instead of 22.14 meters.	TER-02-0005
5	BSC-01-D-142	Abstraction of NFE Thermodynamic Env & Perc Flux	ANL-EBS-HS-000003 REV 00 ICN 02 (E0130)	2) Page II-10, 2nd line from the top should read " for use with the no-backfill SR base case high (not low) infiltration flux ----- "; also on the 5th line, "csnflow" should be csnfhigh since this version is for the high infiltration flux case.	TER-02-0005
5	BSC-01-D-142	Abstraction of NFE Thermodynamic Env & Perc Flux	ANL-EBS-HS-000003 REV 00 ICN 02 (E0130)	3) Page III-1, the first line of the 2nd paragraph states that three versions of the routine maxtwp are used in the AMR. This should be six versions as six versions are documented in attachment III. The last line of the paragraph should read that all 6 routines are presented on the next 15 pages.	TER-02-0005
5	BSC-01-D-142	Abstraction of NFE Thermodynamic Env & Perc Flux	ANL-EBS-HS-000003 REV 00 ICN 02 (E0130)	4) Page III-8, the text paragraph at the bottom of the page, 2nd sentence, there are not seven data columns, there are five.	TER-02-0005
5	BSC-01-D-142	Abstraction of NFE Thermodynamic Env & Perc Flux	ANL-EBS-HS-000003 REV 00 ICN 02 (E0130)	5) Page III-11, the text paragraph near the middle of the page, 2nd sentence, there are not seven data columns, there are five, and the headers are shifted such that "time" is above temperature values and there is no information in the temperature column.	TER-02-0005
5	BSC-01-D-142	Abstraction of NFE Thermodynamic Env & Perc Flux	ANL-EBS-HS-000003 REV 00 ICN 02 (E0130)	6) Page III-13, top of the page, 2nd sentence, the statement is made that this routine is for the high infiltration flux case. This is not correct; version 1.05 is for the low infiltration case.	TER-02-0005
5	BSC-01-D-142	Abstraction of NFE Thermodynamic Env & Perc Flux	ANL-EBS-HS-000003 REV 00 ICN 02 (E0130)	7) Page III-14, the text paragraph near the middle of the page, 2nd sentence, there are not seven data columns, there are five.	TER-02-0005
5	BSC-01-D-142	Abstraction of NFE Thermodynamic Env & Perc Flux	ANL-EBS-HS-000003 REV 00 ICN 02 (E0130)	8) Page IV-21, first line of text, computed should be computer.	TER-02-0005

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5	BSC-01-D-142	Abstraction of NFE Thermodynamic Env & Perc Flux	ANL-EBS-HS-000003 REV 00 ICN 02 (E0130)	9) Page VII-1, last paragraph, 2nd sentence, there is a reference to input files for six routines, it should be for three routines.	TER-02-0005
5	BSC-01-D-142	Abstraction of NFE Thermodynamic Env & Perc Flux	ANL-EBS-HS-000003 REV 00 ICN 02 (E0130)	10) Page VIII-25, last paragraph, the second line reads "----- for both input and input files", it should indicate input and output files.	TER-02-0005
6	BSC-01-D-142	Modeling SubGridblock Scale Dispersion in 3D Hetero	ANL-NBS-HS-000022 REV 00 ICN 01 (S0015)	1) On the Revision Record (page 2 of the AMR), opposite "REV 00 ICN 01", it states "Initial issue: 7/26/00". It should indicate that ICN 01 was issued sometime after 8/30/00 when the document was approved.	TER-02-0011
7	BSC-01-D-142	Subsurface Transporter Safety Systems Analysis	ANL-WER-ME-000001 REV 01	1) The hand calculations on Page II-7 show that 1237.87*4.448222= 55506.32 (0.00% error), but it actually equals 5506.32. Further, the spreadsheet (for Scenario 1, delta h = 3.3) uses different inputs and shows that the result is 1222.56*4.448222=5438.24.	TER-02-0012
8	BSC-01-D-142	Igneous Consequence Modeling for TSPA-SR	ANL-WIS-MD-000017 REV 00 ICN 01 (T0070)	1) Page 11, section 4, 3rd paragraph, end of the 3rd line, the period should be after "events", "and receives in" should be deleted.	TER-02-0007
8	BSC-01-D-142	Igneous Consequence Modeling for TSPA-SR	ANL-WIS-MD-000017 REV 00 ICN 01 (T0070)	2) Page 17, section 5.1.2, 4th line of "rationale", "wind speed" should be wind direction.	TER-02-0007
8	BSC-01-D-142	Igneous Consequence Modeling for TSPA-SR	ANL-WIS-MD-000017 REV 00 ICN 01 (T0070)	3) Page 22, section 5.3.5, there is no "Use in Analysis" section for this assumption.	TER-02-0007
8	BSC-01-D-142	Igneous Consequence Modeling for TSPA-SR	ANL-WIS-MD-000017 REV 00 ICN 01 (T0070)	4) Page 30, section 6.1.1, first line, "represented" should be deleted.	TER-02-0007
8	BSC-01-D-142	Igneous Consequence Modeling for TSPA-SR	ANL-WIS-MD-000017 REV 00 ICN 01 (T0070)	5) Page 33; first line after equation 5, the "is" in the middle of the line should be deleted.	TER-02-0007
8	BSC-01-D-142	Igneous Consequence Modeling for TSPA-SR	ANL-WIS-MD-000017 REV 00 ICN 01 (T0070)	6) Page 51, Table 4, 4th entry (down) on the table, "x-axis" should be y-axis.	TER-02-0007
8	BSC-01-D-142	Igneous Consequence Modeling for TSPA-SR	ANL-WIS-MD-000017 REV 00 ICN 01 (T0070)	7) Page 55, Table 5, the same mistake noted in 6 above is repeated.	TER-02-0007
8	BSC-01-D-142	Igneous Consequence Modeling for TSPA-SR	ANL-WIS-MD-000017 REV 00 ICN 01 (T0070)	8) On DTN SN0010T0502900.003, the same mistake noted in 6 and 7 above is repeated.	TER-02-0007
8	BSC-01-D-142	Igneous Consequence Modeling for TSPA-SR	ANL-WIS-MD-000017 REV 00 ICN 01 (T0070)	9) On DTN SN0010T0502900.003, the DTN indicates that it is for Rev 01 of the AMR, it should indicate Rev 00 ICN 01.	TER-02-0007
8	BSC-01-C-001	Igneous Consequence Modeling for the TSPA-SR	ANL-WIS-MD-000017 Rev. 00 ICN 1	Bin 2 **Volcanic Eruption Release Model** Bin 2 **In-drift Damage Due to Dike Intersection Model**	TER-02-0007
9	BSC-01-D-142	Simulation of Net Infiltration for M & P Climate	ANL-NBS-HS-000032 REV 00 ICN 01 (U0010)	1) On page V-4, the descriptions for the files DAILY09.CTL, DAILY09.FOR, and DAILY09.EXE have been incorrectly replaced by descriptions of BLOCKR7 files.	TER-02-0013
9	BSC-01-D-142	Simulation of Net Infiltration	ANL-NBS-HS-000032	2) On page VI-20 is an example listing of the file	TER-02-0013

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		for M & P Climate	REV 00 ICN 01 (U0010)	"30MSOIL.ASC", or so states the text at the top of the page. However, this exact same text describing the file "30MSOIL.ASC", is repeated on page VI-21 but a different file is presented below the text.	
9	BSC-01-D-142	Simulation of Net Infiltration for M & P Climate	ANL-NBS-HS-000032 REV 00 ICN 01 (U0010)	3) On page VII-12 an excerpt of the file "GEOMAP7.INP" is provided. This is the output file of GEOMAP7 that is to include updated bedrock geology. However the output file is identical to the input file "30MSITE.INP" provided on page VII-9 and no explanation is provided.	TER-02-0013
9	BSC-01-D-142	Simulation of Net Infiltration for M & P Climate	ANL-NBS-HS-000032 REV 00 ICN 01 (U0010)	4) Similar to item 3 above, it is unclear whether the input and output files on pages VIII-7 and VIII-9 are correct file excerpts. All of the rock-type designations are "201" or "202", while a quick look at tables VII-4, VII-6, VIII-2, and VIII-4 indicates that the majority of rock-type designations are in the expected 301 to 345 range. Also, the input (GEOMAP7.INP on page VIII-7) and output (GEOMOD4.INP on page VIII-9) files are again identical, indicating that there were no modifications to the soil depth class by the routine. As it is, given the routine functions that are being documented, the excerpts provide no indication of routine function and no explanation is provided.	TER-02-0013
9	BSC-01-D-142	Simulation of Net Infiltration for M & P Climate	ANL-NBS-HS-000032 REV 00 ICN 01 (U0010)	5) On page XII-2, the description of what the routine VEGCOV01 does (item 4) is surprising given the name of the routine and a reading of the code. Item 4 indicates that the only purpose of the routine is to change the saturated hydraulic conductivity of the Yucca Mountain Tuff, there is no mention of vegetation cover or type. It appears that what is actually changed is the rock type designation of the tuff to account for the change in welding from welded in the northern part of the area to non-welded in the south. More parameters than just hydraulic conductivity will change with the rock type, but table XII-1 demonstrates that the rock type was changed correctly. Though not mentioned at all in the attachment text, the routine also does add terms for vegetation cover and type. The input file (30MGRD01.SR1 on page XII-3 contains "-99" placeholders for vegetation, and the output file (30MGRD04.SR1 on page XII-4) shows these placeholders replaced with integers (4 and 30 in several cases). The auxiliary input file "vegtyp01.xyz" listed at the top of page XII-3 is neither described nor provided in the attachment yet it apparently was used by the routine. The full functionality of the routine needs to be described and demonstrated in the	TER-02-0013

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				attachment, and it is not.	
9	BSC-01-D-142	Simulation of Net Infiltration for M & P Climate	ANL-NBS-HS-000032 REV 00 ICN 01 (U0010)	6) On page XIII-4, item 6, the perimeter cell identifier should always be -3.	TER-02-0013
9	BSC-01-D-142	Simulation of Net Infiltration for M & P Climate	ANL-NBS-HS-000032 REV 00 ICN 01 (U0010)	7) On page XIII-7, top of the page, third line, Attachment VII should be Attachment XII.	TER-02-0013
9	BSC-01-D-142	Simulation of Net Infiltration for M & P Climate	ANL-NBS-HS-000032 REV 00 ICN 01 (U0010)	8) On page XIII-8, second paragraph, third line, "WATSHD20.INP" should probably be "WATSHD20.CTL".	TER-02-0013
9	BSC-01-D-142	Simulation of Net Infiltration for M & P Climate	ANL-NBS-HS-000032 REV 00 ICN 01 (U0010)	9) On page XIII-8 an example input file (30MGRD04.SR1) is provided. This file is said to be from VEGCOV01. However the output file from VEGCOV01 (30MGRD04.SR1 on page XII-4) does not match the file on page XIII-8. The "-99" placeholder values that were changed to integers by VEGCOV01 (see comment 5 above) are here in part placeholders. The 4 and 30 in the first line for example, is now -99 and 30. An explanation as to why these file excerpts which should match but do not needs to be provided, or a correct excerpt needs to be provided if that is the problem.	TER-02-0013
9	BSC-01-D-142	Simulation of Net Infiltration for M & P Climate	ANL-NBS-HS-000032 REV 00 ICN 01 (U0010)	10) On page XIII-9 the reference to Attachment XII in bold text should be to Attachment XI.	TER-02-0013
9	BSC-01-D-142	Simulation of Net Infiltration for M & P Climate	ANL-NBS-HS-000032 REV 00 ICN 01 (U0010)	11) On page XV-5, the listing of electronic files at the top of the page is not complete. Files such as MAPSUM01.EXE, MAPSUM01.CTL and perhaps others need to be added to the list.	TER-02-0013
9	BSC-01-C-001	Simulation Net Infiltration for Modern and Potential Future Climates	ANL-NBS-HS-000032 Rev. 00 ICN 1	Bin 2 **Net Infiltration Model**	TER-02-0013
10	BSC-01-D-142	Two-Dimensional Repository Thermal Design Calculations	CAL-WIS-TH-000001 REV 01	1) The text of attachment I on page I-26 states that for the no-backfill case "response surfaces are provide only for relatively short ventilation periods". Yet two tables are provided, Table I-5 (Response Surface Coefficients for No Backfill (long term)), and Table I-7 (Response Surface Coefficients for No Backfill (short term)). Inspection reveals that the contents of the two tables are identical.	TER-02-0019
10	BSC-01-D-142	Two-Dimensional Repository Thermal Design Calculations	CAL-WIS-TH-000001 REV 01	2) Figure I-5 is indicated to be for the no backfill case according to the text on page I-31 yet the figure itself clearly indicates that backfill with a thermal conductivity of 0.20 W/m k is included.	TER-02-0019
10	BSC-01-D-142	Two-Dimensional Repository Thermal Design Calculations	CAL-WIS-TH-000001 REV 01	3) The density of the backfill is assumed to be essentially the same as the intact welded tuff of the repository horizon. This is a high value for a granular material and no explanation is	TER-02-0019

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				provided.	
10	BSC-01-D-142	Two-Dimensional Repository Thermal Design Calculations	CAL-WIS-TH-000001 REV 01	4) The density of the invert ballast is indicated to be much less than that of the backfill; yet the effective thermal conductivity of these materials are stated to be identical (Table I-9) and no explanation is provided.	TER-02-0019
10	BSC-01-D-142	Two-Dimensional Repository Thermal Design Calculations	CAL-WIS-TH-000001 REV 01	5) Table I-3 provides design basis and average factors for heat generation, drift wall temperatures, and WP temperatures. As expected the design basis is equal to or higher than the average in all cases, with the notable exception of heat generation for 24-BWR waste packages. In that case the design basis is less than one tenth of the average and no explanation is provided.	TER-02-0019
11	BSC-01-D-080	TSPA Model for SR	MDL-WIS-PA-000002	A list of approximately 40 errata (Records System Assession number MOL.20010702.0069) was submitted as CIRS #1713 on 7/3/01 and should be considered when the TSPA Model for License Application is updated.	TER-02-0014
11	BSC-01-C-001	TSPA Model for SR	MDL-WIS-PA-000002 REV 00	Bin 3 **TSPA-SR Model** Bin 3 **Soil Removal Model for Volcanic Disruption**	TER-02-0014
12	BSC-01-D-80	WAPDEG Analysis of Waste Package and Drip Shield Degradation	ANL-EBS-PA-000001 REV 00 ICN 01 (W0050)	ICN 01 of the WAPDEG AMR was prepared in response to a deficiency report LVMO-00D-118 on the AMR and the corrective actions required were deemed complete. Subsequently an independent model validation review indicated that the model validation was not consistent with the procedure AP-3.10Q (now AP-SIII.10Q). This deficient condition will be corrected when the revision of the AMR is completed for TSPA LA in late FY 03. The revision will be tracked and managed as part of BSC-01-D-080, ERRATA list.	TER-02-0015
12	BSC-01-C-001	WAPDEG Analysis of WP and DS Degradation	ANL-EBS-PA-000001 Rev. 00 ICN 1	Bin 3 WAPDEG Analysis of WP and DS Degradation	TER-02-0015
13	N/A	Multiscale Thermohydrologic Model	ANL-EBS-MD-000049 REV 00 ICN 01 (E0120)	1) Page 24, Table 3-1a: The code identification for "heatgenAge v1.0" should be "heatgenAge v1.2" (The DIRS report and Attachment XII of the technical product show the correct version (1.2) of the routine. (Vic Barish)	TER-02-0006
13	N/A	Multiscale Thermohydrologic Model	ANL-EBS-MD-000049, REV 00 ICN 01 (E0120)	2) The code identification for "assembly scripts LDTH*corey, SDT-01* V1.0" contain an asterisk that is used as a wild card, but there is no description of what the asterisk means. The only reason that I know is that I looked at the description of the assembly scripts in paragraph 3.2.19 of the text. There are actually 9 LDTH*corey assembly scripts and 3 SDT-01* assembly scripts. (Vic Barish)	TER-02-0006

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13	BSC-01-C-001	**Multiscale Thermohydrologic Model**	ANL-EBS-MD-000049 Rev. 00 ICN 1	Bin 2 **Multiscale TH Model**	
14	BSC-01-D-028	Characterize Eruptive Processes at Yucca Mountain, Nevada	ANL-MGR-GS-000002 REV 00 (T0025)	There are developed data associated with the conclusion that appear in this report. However, the DTN's for those data are not included in the text of the "Conclusions" section of the report.	TER-02-0009
14	BSC-01-C-001	**Characterize Eruptive Processes at Yucca Mountain, Nevada**	ANL-MGR-GS-000002 Rev. 00	Bin 3 **Geometry of Volcanic Feeder System Model**	TER-02-0009
15	BSC-01-D-028	Dike Propagation Near Drifts	ANL-WIS-MD-000015 REV 00 ICN 01 (T0020)	There are developed data associated with the conclusion that appear in this report. However, the DTN's for those data are not included in the text of the "Conclusions" section of the report.	TER-02-0010
16	BSC-01-D-028	Effects of Fault Displacement on Emplacement Drifts	ANL-EBS-GE-000004 REV 00 ICN 01 (T0115)	There are developed data associated with the conclusion that appear in this report. However, the DTN's for those data are not included in the text of the "Conclusions" section of the report.	TER-02-0008
17	BSC-01-C-001	**Characterize Framework for Seismicity and Structural Deformation at YM**	ANL-CRW-GS-000003 Rev. 00	Bin 2 **Vibratory Ground Motion Hazard** Bin 2 **Fault Rupture Hazard**	TER-02-0020
18	BSC-01-C-001	**Aging and Phase Stability of the WP Outer Barrier**	ANL-EBS-MD-000002 Rev. 00	Bin 2 **Aging and Phase Stability: Precipitation Model** Bin 2 **Aging and Phase Stability: Long Range Ordering Model**	TER-02-0021
19	BSC-01-C-001	**General and Localized Corrosion of the WP Outer Barrier**	ANL-EBS-MD-000003 Rev. 00	Bin 2 **General and Localized Corrosion of the WPOB**	TER-02-0022
20	BSC-01-C-001	**General and Localized Corrosion of the DS**	ANL-EBS-MD-000004 Rev. 00	Bin 2 **General and Localized Corrosion of the Drip Shield**	TER-02-0023
21	BSC-01-C-001	**Stress-Corrosion Cracking of the DS, the WP Outer Barrier, and the Stainless Steel Structural Material**	ANL-EBS-MD-000005 Rev. 00 ICN 1	Bin 2 SCC Threshold Model Bin 2 **SCC Slip Dissolution/Film Rupture Model**	TER-02-0024
22	BSC-01-C-001	**Hydrogen Induced Cracking of DS**	ANL-EBS-MD-000006 Rev. 00 ICN 1	Bin 2 **DS Passive Corrosion** Bin 2 **DS Galvanic Coupling**	TER-02-0025
23	BSC-01-C-001	**Degradation of Stainless Steel Structural Material**	ANL-EBS-MD-000007 Rev. 00	Bin 2 **Degradation of Stainless Steel Structural Materials**	TER-02-0026
24	BSC-01-C-001	**Hydride-Related Degradation of SNF Cladding Under Repository**	ANL-EBS-MD-000011 Rev. 00 ICN 1	Bin 2 **Residual Stress in CSNF Cladding Material**	TER-02-0027

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		Conditions			
25	BSC-01-C-001	Clad Degradation – Localized Corrosion of Zirconium and Its Alloys Under Repository Conditions	ANL-EBS-MD-000012 Rev. 00	Bin 2 Zircaloy Corrosion Rate	TER-02-0028
26	BSC-01-C-001	Clad Degradation – Dry Unzipping	ANL-EBS-MD-000013 Rev. 00	Bin 2 Clad Dry Unzipping Model	TER-02-0029
27	BSC-01-C-001	Clad Degradation – Wet Unzipping	ANL-EBS-MD-000014 Rev. 00	Bin 3 Alternative We Clad Unzipping Model	TER-02-0030
28	BSC-01-C-001	DHLW Glass Degradation	ANL-EBS-MD-000016 Rev. 00 ICN 1)	Bin 2 DHLW Glass Degradation	TER-02-0031
29	BSC-01-C-001	Pure-Phase Solubility Limits – LANL	ANL-EBS-MD-000017 Rev. 00 ICN 1	Bin 2 Pure-Phase Solubility Limits – LANL	TER-02-0032
30	BSC-01-C-001	Secondary Uranium Phase Paragenesis and Incorporation of Radionuclides Into Secondary Phases	ANL-EBS-MD-000019 Rev. 00	Bin 2 Secondary Uranium Phase Paragenesis and Incorporation of Radionuclides Into Secondary Phases	TER-02-0033
31	BSC-01-C-001	Colloid-Associated Radionuclide Concentration Limits: ANL	ANL-EBS-MD-000020 Rev. 00 ICN 1	Bin 2 Colloid-Associated Radionuclide Concentration Limits: ANL	TER-02-0034
32	BSC-01-C-001	In-Drift THC Model	ANL-EBS-MD-000026 Rev. 00 ICN 2	Bin 3 In-Drift THC Model	TER-02-0035
33	BSC-01-C-001	Drift Degradation Analysis	ANL-EBS-MD-000027 Rev. 01	Bin 3 DRKBA Rockfall Model	TER-02-0036
34	BSC-01-C-001	Ventilation Model	ANL-EBS-MD-000030 Rev. 00	Bin 3 Ventilation Model	TER-02-0037
35	BSC-01-C-001	Invert Diffusion Properties Model	ANL-EBS-MD-000031 Rev. 01	Bin 2 Invert Diffusion Properties Model	TER-02-0038
36	BSC-01-C-001	Water Distribution and Removal Model	ANL-EBS-MD-000032 Rev. 01	Bin 2 Water Drainage Bin 2 Thermohydrologic Model Bin 2 DS Condensation Model	TER-02-0039
37	BSC-01-C-001	EBS Radionuclide Transport Model	ANL-EBS-MD-000034 Rev. 00 ICN 1	Bin 3 In-Drift Transport of Radionuclides	TER-02-0040
38	BSC-01-C-001	Incorporation of Uncertainty and Variability of DS and WP Degradation in	ANL-EBS-MD-000036 Rev. 00	Bin 3 Incorporation of Uncertainty and Variability of DS and WP Degradation in WAPDEG Analysis	TER-02-0041

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		WAPDEG Analysis			
39	BSC-01-C-001	In-Package Chemistry Abstraction	ANL-EBS-MD-000037 Rev. 01	Bin 2 In-Package Chemistry Abstraction	TER-02-0042
40	BSC-01-C-001	In-Drift Microbial Communities	ANL-EBS-MD-000038 Rev. 00 ICN 1	Bin 2 In-Drift Microbial Communities	TER-02-0043
41	BSC-01-C-001	In-Drift Gas Flux and Composition	ANL-EBS-MD-000040 Rev. 00	Bin 2 In-Drift Gas Flux and Composition Model	TER-02-0044
42	BSC-01-C-001	In-Drift Colloids and Concentration	ANL-EBS-MD-000042 Rev. 00	Bin 3 In-Drift Colloids and Concentration	TER-02-0045
43	BSC-01-C-001	Seepage/Cement Interactions	ANL-EBS-MD-000043 Rev. 00	Bin 3 Seepage/Cement Interactions Model	TER-02-0046
44	BSC-01-C-001	Seepage/Invert Interactions	ANL-EBS-MD-000044 Rev. 00	Bin 3 Seepage/Invert Interactions	TER-02-0047
45	BSC-01-C-001	In-Drift Precipitates/Salts Analysis	ANL-EBS-MD-000045 Rev. 00 ICN 2	Bin 2 High-Relative Humidity Salts Model	TER-02-0048
46	BSC-01-C-001	Initial Cladding Condition	ANL-EBS-MD-000048 Rev. 00 ICN 1	Bin 2 Initial Oxide Thickness Bin 2 Rod Internal Pressure Bin 2 Cladding Crack Depth Bin 2 Overall Cladding Stress Bin 2 Initial Rod Failure	TER-02-0049
47	BSC-01-C-001	Summary of In-Package Chemistry for Waste Forms	ANL-EBS-MD-000050 Rev. 00	Bin 2 In-Package Chemistry for Waste Forms	AMR Cancelled. No TER required
48	BSC-01-C-001	Flow of Water and Pooling in a WP	ANL-EBS-MD-000055 Rev. 00	Bin 3 Flow into WPs Through Small Openings Model	TER-02-0050
49	BSC-01-C-001	Abstraction of Models of Stress-Corrosion Cracking of Drip Shield and WP Outer Barrier, and Hydrogen-Induced Corrosion of the DS	ANL-EBS-PA-000004 Rev. 00 ICN 1	Bin 2 Manufacturing Defects Abstraction Model Bin 2 Stress and Stress Intensity Factor Profile Abstraction Bin 2 Slip Dissolution Abstraction Model Bin 2 Threshold Stress Intensity Factor Abstraction Model	TER-02-0051
50	BSC-01-C-001	Characterize Framework for Igneous Activity at Yucca Mountain, Nevada	ANL-MGR-GS-000001 Rev. 00 ICN 1	Bin 2 Conditional Distribution for Number of Eruptive Centers Model	TER-02-0052
51	BSC-01-C-001	Dose Conversion Factor Analysis: Evaluation of GENII-S Dose Assessment Methods	ANL-MGR-MD-000002 Rev. 00	Bin 2 Dose Conversion for External Exposure	TER-02-0053
52	BSC-01-C-001	Disruptive Event Biosphere	ANL-MGR-MD-000003	Bin 2 Mass Loading Decay Model Following Deposition of	TER-02-0054

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		Dose Conversion Factor Analysis	Rev. 01	Volcanic Ash Bin 2 Dose Conversion Factor Model for Inhalation – Igneous Disruption	
53	BSC-01-C-001	Nominal Performance Biosphere Dose Conversion Factor Analysis	ANL-MGR-MD-000009 Rev. 01	Bin 2 Resuspension Model Bin 2 Plant Uptake Model Bin 3 Surface Soil Model in GENII-S Bin 3 Radionuclide Transfer to Animals Bin 3 Radionuclide Transfer to Aquatic Food	TER-02-0055
54	BSC-01-C-001	Development of Numerical Grids for UZ Flow and Transport Modeling	ANL-NBS-HS-000015 Rev. 00	Bin 2 Numerical Grids Model	TER-02-0056
55	BSC-01-C-001	UZ and SZ Transport Properties	ANL-NBS-HS-000019 Rev. 00 ICN 1	Bin 2 Equilibrium Matrix Sorption Basis Bin 2 Fracture Sorption Bin 2 Matrix Diffusion	TER-02-0057
56	BSC-01-C-001	Particle Tracking Model and Abstraction of Transport Processes	ANL-NBS-HS-000026 Rev. 00	Bin 2 Fracture-to-Matrix Colloid Filtration	TER-02-0058
57	BSC-01-C-001	UZ Colloid Transport Model	ANL-NBS-HS-000028 Rev. 00	Bin 2 Pu Sorption on Colloids	TER-02-0059
58	BSC-01-C-001	Input and Results of the Base-Case SZ Flow and Transport Model for TSPA	ANL-NBS-HS-000030 Rev. 00	Bin 2 Pipe Model for Daughter Radionuclides Bin 3 Abstraction of FEHM and Coupling with UZ Mass Flux Bin 3 Transport Parameters from C-Wells and Laboratory Studies	TER-02-0060
59	BSC-01-C-001	SZ Colloid Facilitated Transport	ANL-NBS-HS-000031 Rev. 00	Bin 2 Saturated Zone Colloid Facilitated Transport	TER-02-0061
60	BSC-01-C-001	Abstraction of Drift Seepage	ANL-NBS-MD-000005 Rev. 01	Bin 2 Abstraction of Drift Seepage Bin 2 Abstraction of Thermal Seepage Effects	TER-02-0062
61	BSC-01-C-001	DSNF and Other Waste Form Degradation Abstraction	ANL-WIS-MD-000004 Rev. 01 ICN 1	Bin 2 Waste Form Degradation Abstraction – Upper Limit Model Bin 2 Waste Form Degradation Abstraction – Conservative Model Bin 3 Waste Form Degradation Abstraction – Best Estimate Model Bin 3 Waste Form Degradation Abstraction –Immobilized Pu Model	TER-02-0063
62	BSC-01-C-001	Inventory Abstraction	ANL-WIS-MD-000006 Rev. 00 ICN 2	Bin 2 Inventory Abstraction	TER-02-0064
63	BSC-01-C-001	Clad Degradation –	ANL-WIS-MD-000007	Bin 3 Summary and Abstraction – Clad Unzipping and	TER-02-0065

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		Summary and Abstraction	Rev. 00 ICN 1	Fuel Dissolution	
64	BSC-01-C-001	Summary of Dissolved Concentration Limits	ANL-WIS-MD-000010 Rev. 01	Bin 2 Dissolved Concentration Limits	TER-02-0066
65	BSC-01-C-001	Waste Form Colloid-Associated Concentration Limits: Abstraction and Summary	ANL-WIS-MD-000012 Rev. 00 ICN 1	Bin 2 Waste Form Colloid-Associated Concentration Limits: Abstraction and Summary	TER-02-0067
66	BSC-01-C-001	EBS Radionuclide Transport Abstraction	ANL-WIS-PA-000001 Rev. 00 ICN 2	Bin 3 EBS Radionuclide Transport Abstraction Model	TER-02-0068
67	BSC-01-C-001	Performance Assessment and Sensitivity Analysis of Disposal of Plutonium as Can-in-Canister Ceramic	ANL-WIS-PA-000003 Rev. 00	Bin 3 Pu-Ceramic Degradation Model for TSPA-SR	TER-02-0069
68	BSC-01-C-001	Effective Thermal Conductivity for Drift-Scale Models Used in TSPA-SR	CAL-EBS-HS-000001 Rev. 00	Bin 3 Effective Thermal Conductivity for Drift-Scale Models Used in TSPA-SR	TER-02-0070
69	BSC-01-C-001	Breakage of CSNF Cladding by Mechanical Loading	CAL-EBS-MD-000001 Rev. 00	Bin 3 Breakage of CSNF Cladding by Seismic Loading Bin 3 Breakage of CSNF Cladding by Static Loading	TER-02-0071
70	BSC-01-C-001	Calculation of General Corrosion Rate of DS and WP Outer Barrier to Support WAPDEG Analysis	CAL-EBS-PA-000002 Rev. 01	Bin 2 Calculation of General Corrosion Rate of DS and WPOB to Support WAPDEG Analysis	TER-02-0072
71	BSC-01-C-001	Rockfall on DS	CAL-EDS-ME-000001 Rev. 00	Bin 2 Rockfall on DS Model	TER-02-0073
72	BSC-01-C-001	Calculation of Permeability Change Due to Coupled THM Effects	CAL-NBS-MD-000002 Rev. 00	Bin 3 THM Model	TER-02-0074
73	BSC-01-C-001	Thermal Evaluation of Breached 21-PWR WPs	CAL-UDC-ME-000002 Rev. 00	Bin 3 Thermal Evaluation of Breached 21-PWR WPs	TER-02-0075
74	BSC-01-C-001	Stainless Steel in WPs for TSPA-SR	CAL-WIS-MD-000010 Rev. 00	Bin 2 Stainless Steel in WPs for TSPA-SR	TER-02-0076
75	BSC-01-C-001	Drift-Scale Coupled Processes (DST and THC Seepage) Models	MDL-NBS-HS-000001 Rev. 01 ICN 1	Bin 2 DST THC Calibration Model Bin 2 THC Seepage Model	TER-02-0077
76	BSC-01-C-001	Seepage Model for PA Including Drift Collapse	MDL-NBS-HS-000002 Rev. 01	Bin 2 Seepage Model for PA Including Drift Collapse	TER-02-0078
77	BSC-01-C-001	Calibrated Properties Model	MDL-NBS-HS-000003 Rev. 00	Bin 2 Calibrated Properties Model	TER-02-0079

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78	BSC-01-C-001	Seepage Calibration Model and Seepage Testing Data	MDL-NBS-HS-000004 Rev. 01	Bin 2 Seepage Calibration Model	TER-02-0080
79	BSC-01-C-001	Conceptual and Numerical Models of UZ Flow and Transport	MDL-NBS-HS-000005 Rev. 00	Bin 2 Conceptual Model of UZ Flow Bin 2 Numerical Model of UZ Flow Bin 2 Active Fracture Model	TER-02-0081
80	BSC-01-C-001	Mountain-Scale Coupled Processes	MDL-NBS-HS-000007 Rev. 00	Bin 2 Mountain-Scale Coupled Processes	TER-02-0082
81	BSC-01-C-001	Radionuclide Transport Models Under Ambient Conditions	MDL-NBS-HS-000008 Rev. 00	Bin 3 FRACL Calibration to Borehole Chloride Bin 2 EOS9nT Calibration to ESF Chloride Profile	TER-02-0083
82	BSC-01-C-001	Calibration of the Site-Scale SZ Flow Model	MDL-NBS-HS-000011 Rev. 00	Bin 2 Site-Scale Saturated Zone Flow Model	TER-02-0084

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OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT U.S. DEPARTMENT OF ENERGY WASHINGTON, D.C.

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CONDITION ADVERSE TO QUALITY CONTINUATION PAGE

Block 22 Corrective Action Verified (continued)

Block 14a Immediate actions committed to discussions with management and group meetings to ensure understanding of appropriate immediate actions. The QAR reviewed BSC Memorandum from William Watson to Robert Andrews dated 9/18/01 that documents the communications of the requirements. The training material and attendance records for staff personnel were evaluated and found to meet the commited actions. Verification was satisfactory.

Block 14 Remedial actions - the final amended complete response dated 3/6/02 provided a complete extent of condition and indicated that all technical errors in approved technical products have been documented in accordance with AP-15.3Q. The QAR reviewed the complete Errata list provided as part of the extent of condition and noted that a specific TER (Technical Error Report) had been generated for each noted error. The list of TERs issued was obtained from the TER Coordinator and compared to the Errata list and found to match as required. From the list of TERs on the TER log, it was noted that as of 3/22/02 that 84 TERs had been assigned to responsible managers. In order to verify that TERs had indeed been issued as noted, a random sample of 11 TERS representing several responsible managers was selected. Each of the responsible managers were requested to provide a hard copy of the TER they were responsible for. The following TERs were obtained:

Number	Responsible Manager
TER-02-0002	Anthony Smith
TER-02-0013	Joe Wang
TER-02-0022	T. Summers
TER-02-0028	C. Stockman
TER-02-0038	Dan Thomas
TER-02-0045	Dan Thomas
TER-02-0052	K. Gaither
TER-02-0061	Al Eddebbarh
TER-02-0069	J. McNeish
TER-02-0076	C. Stockman
TER-02-0083	Joe Wang

Satisfactory presentation of each of the above sampled TERs is considered to be evidence that TERs have been issued as stated. Verification is satisfactory.

Block 15 - Extent of condition. The submittal of the Errata list for the extent of condition was reviewed and found to contain those issues identified to be technical errors imported from other DR/CARS.

Block 17 - Action to Preclude Recurrence. The final agreed upon action to preclude recurrence was the definition of an independent process to manage technical errors. This process was defined in AP-15.3Q, Control of Technical Errors which was effective 2/11/02. The QAR reviewed this procedure as it was being prepared and found it adequate the manage the issues identified by this DR. Verification of this action is satisfactory.

Based on the above reviews, the QAR considers that actions have been satisfactorily completed for closure of this deficiency.

William J. Glasser 4/19/02
William J. Glasser QAR