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**TECHNICAL SUPPORT DOCUMENT FOR 194.27:
SALADO FLOW CONCEPTUAL MODELS PEER REVIEW**

**U. S. ENVIRONMENTAL PROTECTION AGENCY
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EXECUTIVE SUMMARY

This report presents an evaluation of the extent of compliance of the U.S. Department of Energy (Department) Salado Flow Conceptual Models Peer Review with the process requirements of the U.S. Environmental Protection Agency (Agency) for conducting peer reviews. This peer review was undertaken to evaluate conceptual model changes proposed by the Department for assessing the performance of the Waste Isolation Pilot Plant in southeastern New Mexico. The peer review was conducted between April 2002 and February 2003, pursuant to a peer review procedure and plan prepared by the Department. The technical qualifications and independence of the peer reviewers were reviewed and the entire peer review process was documented by the Department.

The peer review process was evaluated using a checklist prepared by the Agency. This checklist was based on the requirements of 40 CFR 194.27 including the requirement to conduct the review in accordance with the U.S. Nuclear Regulatory Commission document NUREG-1297, *Peer Review for High-Level Nuclear Waste Repositories*. The checklist was used three times in preparing this report: first, for evaluating the Department's peer review procedure; second, for evaluating the Department's peer review plan; and third, for evaluating the implementation of the review. The completed checklists are presented as tables to this report. These evaluations were based on detailed reviews of peer review documentation and observations made during peer review meetings.

The peer review was conducted in two stages. Residual issues identified by the Peer Panel during the initial meetings in April and May, 2002, were addressed during the final meetings in February, 2003. The Department's peer review procedure and plan were revised between the first and second stages to better comply with the Agency's peer review requirements. Also, another person was added to the Panel for the second stage of the review to provide additional numerical modeling expertise. Because the Peer Panel's final report documents both stages of the review and was prepared pursuant to the revised procedure and plan, conformance of the final documentation with Agency requirements was emphasized in this Agency evaluation.

The Department's revised peer review procedure and plan were found to satisfactorily address most of the Agency's requirements. Although exceptions to the Agency's requirements are identified in this report, they were minor and did not affect the adequacy of the review. It is therefore concluded that the Salado Flow Conceptual Models Peer Review was conducted in conformance with Agency requirements.

1.0 INTRODUCTION

This report provides an evaluation of the degree of conformance of the U.S. Department of Energy (DOE; the Department) Salado Flow Conceptual Models Peer Review with the process requirements of the U.S. Environmental Protection Agency (EPA; the Agency) for conducting peer reviews. The independent peer review evaluated in this report addressed changes to conceptual models used by the Department to assess the performance of the Waste Isolation Pilot Plant (WIPP) in southeastern New Mexico. These changes are proposed by the Department for use in the performance assessment (PA) for the first recertification of the WIPP. Recertification is required by Section 8(f) of the WIPP Land Withdrawal Act at five-year intervals following the date of first waste disposal to demonstrate the facility's continuing compliance with regulatory requirements. An earlier peer review was conducted in 1996 and 1997 to support WIPP's original Compliance Certification Application (CCA). Peer review of conceptual models is required by the Agency in 40 CFR 194.27 (EPA 1998). The Agency's requirements for the peer review include conducting the review in a manner that is compatible with the U.S. Nuclear Regulatory Commission (NRC) guidance in NUREG-1297, *Peer Review for High-Level Nuclear Waste Repositories* (NRC 1988).

The peer review evaluated in this report was conducted by the Department in two stages. The initial Peer Panel meetings occurred in April and May, 2002, and the final meetings occurred in February, 2003. This report documents the activities of both stages of the review and presents final conclusions and recommendations for the review process. The Department's peer review procedure and plan were revised between the first and second stages to better comply with the Agency's peer review requirements. Also, another person was added to the Panel for the second stage of the review to provide additional numerical modeling expertise. Because the Peer Panel's final report (Caporuscio et al. 2003) documents both stages of the review and was prepared pursuant to the revised procedure and plan, it is considered to supersede the earlier, interim report (Caporuscio et al. 2002) and was emphasized in this Agency evaluation. Conformance of the final documentation with Agency requirements was therefore emphasized in this Agency evaluation.

The procedural adequacy of the peer review was evaluated in this report using a checklist provided by the Agency. The checklist identifies all significant requirements of 40 CFR 194.27 and NUREG-1297 for conducting peer reviews. Completed copies of this checklist are presented in Tables 1 through 3 of this report. The adequacy of the peer review process was determined based on a review of the Department's peer review procedure, plan, and report; observation of the peer review presentations and Peer Panel caucuses; and a review of the quality assurance files documenting the peer review. Although the evaluation documented in this report is not equivalent to a quality assurance surveillance, quality assurance requirements were considered when evaluating the adequacy of the peer review.

The following sections of this report document the Agency's reviews of the Department's peer review procedure (Section 2.0) and peer review plan (Section 3.0), followed by an evaluation of the peer review implementation (Section 4.0). Conclusions are presented in Section 5.0.

2.0 PEER REVIEW PROCEDURE

2.1 Procedure for 2002 Peer Review Meetings

The 2002 peer review meetings were conducted under the Department's Carlsbad Field Office (CBFO) Management Procedure (MP) 10.5, Revision 4, "Peer Review" (DOE 2002a). Some of the requirements in the Agency's peer review checklist were found to address situations that do not apply to this peer review or to the procedure and were identified as not applicable. Most of the remaining requirements were repeated in the procedure essentially verbatim from NUREG-1297 and for these the procedure is considered to be in compliance. Two requirements from NUREG-1297 were not carried forward into the Department's 2002 procedure in their entirety. These are addressed in the following paragraphs.

Checklist Item #11: Does the peer review group chairperson determine the peer review process used? (NUREG-1297 Section IV.4). The Department's 2002 procedure did not specifically state that the chairperson determines the peer review process used. The procedure divided responsibility for the peer review between a peer review manager and the peer review chairperson. The peer review manager was identified in Section 3.2 of the Department's procedure as the administrative manager of the peer review process. The peer review chairperson was identified in that same section as the technical lead for the peer Panel, providing technical direction for Peer Panel report documentation.

The peer review process was identified in Section I-6.2.2 of the Department's procedure as consisting of "... an in-depth analysis and evaluation of documented assumptions, calculations, extrapolations, alternate interpretations, methodology, acceptance criteria employed, [and] the conclusions drawn in the original work in accordance with approved technical and quality assurance requirements, and the applicable peer review plan(s)." Similar terminology is used in NUREG-1297 Section IV.4 to describe the scope of the Peer Panel's evaluation and reporting. Sections I-6.2.5 and I-6.2.6 of the Department's procedure stated "The peer review chairperson shall provide technical leadership of the Peer Panel members." and "The peer review chairperson shall delegate, with the assistance of the peer review manager, the assignments of specific review tasks and activities among Peer Panel members." By giving the peer review chairperson responsibility for technical leadership of the Panel and for assigning specific review tasks and activities to Panel members, the chairperson is in fact identifying the manner in which the required evaluations and activities are conducted. Although the Department's procedure did not specifically state that the chairperson determines the peer review process used, the chairperson's overall technical direction of the Panel provided the level

of responsibility envisioned by NUREG-1297. On this basis, the Department's 2002 peer review procedure was compatible with this requirement of NUREG-1297.

Checklist Item #12: Does the PRG evaluate and report on the following?

- (a) validity of assumptions;**
 - (b) alternate interpretations;**
 - (c) uncertainty of results and consequences if wrong;**
 - (d) appropriateness and limitations of methodology and procedures;**
 - (e) adequacy of application;**
 - (f) accuracy of calculations;**
 - (g) validity of conclusions;**
 - (h) adequacy of requirements and criteria.**
- (NUREG-1297 Section IV. 4.)

Section I-6.2.2 of the Department's 2002 procedure stated "The peer review process shall consist of an in-depth analysis and evaluation of documented assumptions, calculations, extrapolations, alternate interpretations, methodology, acceptance criteria employed, [and] the conclusions drawn in the original work in accordance with approved technical and quality assurance requirements, and the applicable peer review plan(s)." The scope identified in the Department's 2002 procedure did not include NUREG-1297 criteria (c): *uncertainty of results and consequences if wrong*; or (e): *adequacy of application*. The Department's 2002 peer review procedure was therefore not in compliance with this requirement of NUREG-1297.

2.2 Procedure for 2003 Peer Review Meetings

The 2003 peer review meetings were conducted under the Department's Carlsbad Field Office (CBFO) Management Procedure (MP) 10.5, Revision 5, "Peer Review" (DOE 2003a). This revision modified the 2002 procedure to address the two checklist issues identified above in the following manner.

Checklist Item #11: Does the peer review group chairperson determine the peer review process used? (NUREG-1297 Section IV.4). The Department's 2003 procedure more directly addresses this requirement. The definition of "peer review chairperson" in Section 3.2 and the chairperson's responsibilities in Section I-6.2.5 of the procedure have been expanded to specifically state that the chairperson is responsible for determining the manner in which the required peer review evaluations and reporting are conducted. Because the peer review "process" is by definition "the manner in which the peer review is conducted," these modifications directly and adequately address this Agency requirement.

Checklist Item #12: Does the PRG evaluate and report on the following?

- (a) validity of assumptions;**
- (b) alternate interpretations;**

- (c) uncertainty of results and consequences if wrong;**
 - (d) appropriateness and limitations of methodology and procedures;**
 - (e) adequacy of application;**
 - (f) accuracy of calculations;**
 - (g) validity of conclusions;**
 - (h) adequacy of requirements and criteria.**
- (NUREG-1297 Section IV. 4.)

Section I-6.2.2 of the Department's 2003 procedure specifically identifies each of the eight NUREG evaluation and reporting criteria listed above. This modification directly and adequately addresses this Agency requirement.

A comparison of the Department's 2003 Peer Review Procedure (DOE 2003a) with the Agency's peer review checklist is presented in Table 1. This procedure adequately addresses all checklist requirements.

3.0 PEER REVIEW PLAN

3.1 Plan for 2002 Peer Review Meetings

The Salado Flow Peer Review Plan describes process and documentation requirements for applying peer review procedure CBFO MP 10.5 to the Salado Flow Conceptual Models Peer Review. The plan used in the 2002 peer review meetings (DOE 2002b) was prepared by the Department to implement CBFO MP 10.5, Revision 4 (DOE, 2002a) discussed in Section 2.1 of this report. The plan described the approach, purpose, and scope of the peer review. The 2002 plan was in general conformance with the requirements of NUREG-1297 either through incorporating the requirements of the procedure CBFO MP 10.5 by reference or through repeating the requirements of NUREG-1297 directly in the plan. However, two NUREG-1297 requirements were not fully addressed in the 2002 plan and are further discussed below.

Checklist Item #10: (a) Independence Requirement: Is the peer review group independent of the original work to be reviewed? (b) For peer review group members not totally independent, is an adequate documented rationale provided?
(NUREG-1297 Section IV. 3. b.)

Although Section 1.1 Para 4 of the 2002 plan stated "The peer reviewers shall be independent of the work being reviewed...", the Peer Panel's independence from the Department's influence was potentially compromised by the following statement in Section 2.2 Para 5 of the plan: "At the request of the Department CBFO Assistant Manager, or designee, a draft of this report [the peer review report] may be provided to the Department CBFO for comment prior to finalization. However, to ensure the independence of the Panel's conclusions, the Department CBFO comments are for information only." Any review of the Peer Panel's work by the Department or its contractors should be limited to assuring the accuracy of the Panel's understanding of the

work under review and should be performed only at the Panel's request. The Panel's evaluations and conclusions should not be reviewed in draft form by the Department. The provision allowing the Department to review and comment on a draft of the peer review report was not compatible with the independence requirement of NUREG-1297.

Checklist Item #12: Does the peer review group evaluate and report on the following?

- (a) validity of assumptions;**
- (b) alternate interpretations;**
- (c) uncertainty of results and consequences if wrong;**
- (d) appropriateness and limitations of methodology and procedures;**
- (e) adequacy of application;**
- (f) accuracy of calculations;**
- (g) validity of conclusions;**
- (h) adequacy of requirements and criteria.**

(NUREG-1297 Section IV. 4.)

Section 2.2 Para 3 of the plan stated "The Peer Panel shall perform their review using the adequacy criteria discussed in Section 2.3 as a guide. The scope of this peer review is only for changes to conceptual models that were peer reviewed previously; therefore, many of the adequacy criteria are not subject to peer review due to their prior evaluation." Each of the eight NUREG-1297 evaluation and reporting criteria should be addressed by the Peer Panel and the applicability of specific criteria should be determined by the Panel and not by the Department. Although Section 2.3 Para 1 of the plan repeated all eight of the foregoing NUREG criteria verbatim, it incorrectly identified them as guidance rather than requirements.

3.2 Plan for 2003 Peer Review Meetings

The 2003 peer review meetings were conducted under the Department's Salado Peer Review Plan, Revision 1 (DOE 2003b). This revision modified the 2002 plan to address the two checklist issues identified above in the following manner.

Checklist Item #10: (a) Independence Requirement: Is the peer review group independent of the original work to be reviewed? (b) For peer review group members not totally independent, is an adequate documented rationale provided?

(NUREG-1297 Section IV. 3. b.)

The statement in Section 2.2 Para 5 of the 2002 plan, allowing the Department to review and comment on a draft of the peer review report, has been removed from Revision 1 of the plan. This modification adequately eliminates this potential for compromising the independence of the Peer Panel.

Checklist Item #12: Does the peer review group evaluate and report on the following?

- (a) validity of assumptions;**
 - (b) alternate interpretations;**
 - (c) uncertainty of results and consequences if wrong;**
 - (d) appropriateness and limitations of methodology and procedures;**
 - (e) adequacy of application;**
 - (f) accuracy of calculations;**
 - (g) validity of conclusions;**
 - (h) adequacy of requirements and criteria.**
- (NUREG-1297 Section IV. 4.)

Section 2.2 Para 3 of the 2002 plan stated "The Peer Panel shall perform their review using the adequacy criteria discussed in Section 2.3 as a guide. The scope of this peer review is only for changes to conceptual models that were peer reviewed previously; therefore, many of the adequacy criteria are not subject to peer review due to their prior evaluation."

The modified statement, in Section 2.2 Para 4 of the 2003 plan, states "The Peer Panel shall perform their review using the evaluation criteria discussed in Section 2.3. Since this peer review is for changes to conceptual models that were peer reviewed previously, many of the adequacy criteria are not applicable because they were determined in the first peer review."

The modified statement presented above and in Section 2.3 Para 1 of the 2003 plan appropriately no longer identifies the NUREG's evaluation and reporting criteria as guidance; however, Section 2.2 para 4 of the plan still retains the nonspecific observation that many of these criteria "...are not applicable because they were determined in the first peer review." This observation is not appropriate in the plan because the applicability or non-applicability of criteria should be independently determined by the Panel and not potentially influenced by the Department. The issues raised with regard to the 2002 peer review plan have only partially been resolved by the modifications in the 2003 plan.

A comparison of the Department's 2003 Salado Flow Peer Review Plan (DOE 2003b) with the Agency's peer review checklist is presented in Table 2. The potential influence on the peer reviewers of the Department's statement that many of the required NUREG evaluation and reporting criteria "...are not applicable..." has not been adequately resolved. However, the Agency believes this items was adequately resolved during the implementation of the peer review, See Section 4.3.

4.0 PEER REVIEW IMPLEMENTATION

4.1 Peer Review Meetings and Schedule

The Salado Flow Conceptual Models Peer Review was conducted in the offices of Sandia National Laboratories (SNL) in Carlsbad, New Mexico. SNL is designated by the Department as the Science Advisor for WIPP. Most of the technical information

presented to the Peer Panel was provided by SNL staff. The first stage of the peer review began on Monday, April 29, 2002, with Peer Panel orientation. Technical presentations by SNL began on April 30 and continued through May 2. Several hours were allocated each day for Peer Panel review and internal discussion. On Friday, May 3, following completion of the initial technical presentations, the Peer Panel chairperson identified individual review and writing assignments. The Panel spent the following week reviewing the information that had been provided and identifying any residual questions and issues. The Panel reconvened in Carlsbad on Monday, May 13, to address remaining issues with the Department and SNL personnel. Following resolution of remaining issues, the Peer Panel met on Tuesday, May 14, for a status review and final writing assignments. A draft report was compiled for internal review and a final report for the first stage review was issued to the Department on Friday, May 31, 2002 (Caporuscio et al. 2002). Although Section 2.2 of the 2002 Salado Flow Peer Review Plan (DOE 2002b) allowed for review of the draft report by the Department, Mr. Daryl Mercer, the Department's Acting Responsible Assistant Manager for the review, stated that this review option was not exercised (personal communication, July 3, 2002).

The second and final stage of the peer review began on Monday, February 10, 2003, with Peer Panel orientation. The review process was essentially the same as described above for the first stage. Technical presentations by SNL were made on February 11 and 12. Several hours were allocated each day for Peer Panel review and internal discussion. The Panel reconvened in Carlsbad on Tuesday, February 18, to address remaining issues with the Department and SNL personnel. A draft report was compiled for internal review and a final report was issued to the Department on Tuesday, March 4, 2003 (Caporuscio et al. 2003). This report documented Panel activities during both the first and second stages of the review and was not prepared as a supplement to the Panel's May 2002 report.

The Panel's activities were observed by representatives of the Agency, SNL, the Department, the New Mexico Environmental Evaluation Group (EEG), and others. Observers were required to obey strict protocols for interacting with the Panel's activities. Observers were allowed to ask questions and raise issues, but only in writing. All activities related to the peer review were documented on pre-prepared forms and meeting minutes.

4.2 Peer Panel Members

During the first stage of the review, the Peer Panel consisted of three individuals with expertise in rock mechanics (Dr. John Gibbons, who was also the Panel's Chairperson), numerical modeling of fluid flow (Dr. Eric Oswald), and geologic disposal systems (Dr. Florie Caporuscio). Each of these individuals also served on the original CCA Peer Panel and was familiar with the conceptual models used in WIPP performance assessment. The qualifications of these individuals are presented in Appendix A of the two peer review reports (Caporuscio et al. 2002 and 2003). Section 2.4 of the first peer review report states that "Dr. Gibbons assigned Dr. Oswald responsibility for review of the Disposal

Room Geometry conceptual model; Dr. Caporuscio was assigned responsibility for review of the Repository Fluid Flow conceptual model, and Dr. Gibbons took responsibility for review of the Disturbed Rock Zone conceptual model." An additional peer reviewer, Dr. Chunhong Li, was added to the Panel during the second stage of the review. Dr. Li was assigned responsibility for review of overall mathematical representations and modeling (Caporuscio et al. 2003, p. 12). Dr. Li's qualifications are presented in Appendix A of the final peer review report (Caporuscio et al. 2003). The remaining technical assignments were unchanged from the first stage review.

Documentation of Panel member independence and organizational conflicts of interest is presented in Appendices B and C of the two peer review reports (Caporuscio et al. 2002 and 2003). Dr. Gibbons and Dr. Caporuscio were previously employed by Department contractors for work at Department facilities. Dr. Caporuscio worked for a Department contractor at Los Alamos National Laboratory and Dr. Gibbons worked for a Department contractor on the Yucca Mountain Project. Also, as previously noted, the three original Panel members had previously served as Panel members for the 1996-1997 WIPP CCA peer review. The experience and familiarity with WIPP gained through that involvement is considered an asset. None of these engagements should have affected the ability of these individuals to provide an unbiased, independent peer review. Appendix C of the two peer review reports (Caporuscio et al. 2002 and 2003) presents an affidavit signed by Mr. John Thies, Peer Review Manager, stating that through a review of each Panel member's background and employment history and a personal interview with each member, he has determined that none of the selected Panel members has a bias or an organizational conflict of interest related to this peer review.

An apparent discrepancy was observed by the Agency in Dr. Li's panel member independence form (Caporuscio et al. 2003, Appendix B). Although Dr. Li answered 'no' to the questions regarding whether he is currently or was previously employed by DOE or by a DOE Contractor, his technical qualification summary (Caporuscio et al. 2003, Appendix A) indicates extensive experience at the Department's Yucca Mountain Project. According to Dr. Li's resume, provided at the Agency's request by the Department's Peer Review Manager during the 2003 peer review meetings, Dr. Li is currently employed by Framatone ANP, a subcontractor to the Department's prime contractor for the Yucca Mountain Project. Upon further evaluation, the Agency determined that the relationship of Dr. Li to the Department was an honest omission on the part of Dr. Li and an oversight on the part of the Department. This decision is supported by the clear identification of Dr. Li as a Framatone employee on his resume, which was freely provided by the Department during the peer review, and by the Agency's observation of Dr. Li's professional and unbiased conduct during the peer review. Dr. Li's relationship to the Department's Yucca Mountain Project is similar to that of Dr. Gibbons, and would not have presented an independence issue if it had been properly documented. The Agency concludes that Dr. Li's employment relationship to the Department has not negatively impacted his ability to perform an independent peer review.

The information gathered by individual members during their reviews was freely disseminated among all of the Panel members. In discussions of the Panel's information gathering and evaluation methodology in Section 2.4 of both reports (Caporuscio et al. 2002 and 2003), formal and informal discussions among the Panel members were included as important parts of the process. The consensus achieved within the Panel on the results of the review was based on a pooling of resources and knowledge rather than relying only on the abilities of single individuals.

On the first day of technical deliberations, the Agency raised the question of whether the Panel members as a group had sufficient capability in numerical modeling of fluid flow to adequately review the proposed model changes. The Agency compared the Panel's scope as identified in the Department's peer review plan with the technical expertise and experience of the Panel members. The Agency determined that the Panel appeared to have the requisite expertise to address the proposed changes at a conceptual level but that a final determination of capability would depend on the thoroughness of the Panel's review and the nature of the issues raised. Because the Panel could pursue issues related to the model changes in unforeseen directions, the ultimate scope of the review and the ability of the Panel to adequately address that scope could not be determined in advance. The Agency therefore tentatively accepted the Peer Panel subject to an evaluation of the adequacy of the Panel members' expertise at the conclusion of the review. The extensive modeling experience of Dr. Chunhong Li, who was added as a Panel member during the second stage of the review, has substantially added to the Panel's expertise in this area. A review of Panel member qualifications indicated that each Panel member had extensive expertise and experience in his subject areas. The combined expertise of these individuals was determined to be sufficient to address the scope of this peer review.

4.3 Implementation of 2002 and 2003 Peer Reviews

All items on the Agency's peer review checklist for the first and second stage peer review implementation were either *In Compliance* or *Not Applicable*. The three checklist items in the 2002 peer review procedure and plan that were found to be Not In Compliance during the first stage peer review, discussed in Sections 2.1 and 2.2 of this report, were all corrected during implementation. The checklist item that was found to be Not In Compliance when reviewing the Department's 2003 peer review plan (DOE 2003b), discussed in Section 3.2 of this report, was also adequately addressed during peer review implementation. The single instance where a NUREG criterion was identified in the Peer Panel's final report as non-applicable involved alternative interpretations for changes in the waste panel closure system geometry (Caporuscio et al. 2003, Section 3.1.2.3). These changes were made by the Department in response to the Agency's mandate to incorporate the Option D waste panel closure system, and no alternative panel closures therefore needed to be considered by the Peer Panel. This conclusion of non-applicability is appropriate in regard to the panel closure system changes and supports the conclusion that the non-applicability statement in Section 2.2 of the 2003 plan did not unduly influence the Peer Panel members.

The Agency concludes that both stages of the Salado Flow Conceptual Models Peer Review were implemented in compliance with the Agency requirements in 40 CFR Part 194.27 and with NUREG-1297. A comparison of the peer review implementation with the Agency's peer review checklist is presented in Table 3.

4.4 Adequacy of Documentation

The following documents were reviewed for this report and found to adequately explain the peer review process.

The Department's procedure CBFO MP 10.5, *Peer Review* (DOE 2002a and 2003a), was prepared to define the peer review process. The most recent version of this procedure is evaluated against the Agency's peer review checklist in Table 1 of this report.

The Department's *Salado Peer Review Plan* (DOE 2002b and 2003b) was prepared to implement the peer review process. The most recent version of this plan is evaluated against the Agency's peer review checklist in Table 2 of this report.

The peer reviewer selection process was adequately documented as follows.

- A signed memorandum was prepared by the Peer Review Manager identifying the three members of the Department's 2002 Peer Review Panel Selection Committee and the basis for selecting each committee member. The selection committee members consisted of the Peer Review Manager, a technical representative, and a quality assurance representative. Although a similar memorandum was not available to the Agency for the 2003 Peer Review Panel Selection Committee, that committee consisted of the Peer Review Manager and two technical representatives who were known to the Agency to have the requisite knowledge and independence.
- A *Peer Reviewer Selection/Non-Selection Justification Form* was prepared documenting the subject matter to be reviewed, the expertise, experience, and education requirements, the independence requirements, and the schedule commitment requirements of the peer reviewers. This form was accompanied by a list of peer reviewer candidates containing an explanation justifying the elimination of those that were not selected. This list was signed by the three selection committee members. Reasons for not selecting specific individuals included conflict of interest, previous support of the WIPP, equally or more qualified individuals available, and unable to contact.
- A signed memorandum was prepared by the three members of the Peer Panel member selection committee identifying the three Peer Panel members that were selected and the justification for their selection.
- The technical qualifications of each of the selected Peer Panel members were included in Appendix A of the peer review reports. These qualifications indicated that the collective expertise and experience of the Panel members was sufficient to adequately address the scope of the review.

- A signed memorandum prepared by the Peer Review Manager documenting selection of Dr. John Gibbons as the chairperson of the Peer Panel, and a signed acceptance of that position by Dr. Gibbons. The three affected conceptual models that were evaluated by the Peer Panel were identified in this memorandum.
- Signed *Determination of Peer Panel Member Independence* forms were included from each selected Peer Panel member. Copies of these forms were presented in Appendix B of the peer review reports. No issues that would suggest impartiality or lack of independence were identified.
- Affidavits signed by the Peer Review Manager certifying that through reviewing each of the selected Peer Panel member's backgrounds and employment histories, and through personal interviews, none of the Panel members were found to have any organizational conflict of interest or bias for or against the WIPP as a nuclear waste repository. Copies of these affidavits are included in Appendix C of the peer review reports.

Minutes were prepared for both the peer review meetings and the Peer Panel caucus sessions. These minutes document the leadership role of the Panel chairperson in determining and guiding the peer review process. The minutes adequately capture the schedule and flavor of the meetings but contain incomplete information on technical discussions and should not be relied upon as sources technical information.

A final peer review report was prepared that clearly identifies the subject matter of the review and the conclusions reached. The report documents that full and frank discussions were held between the peer review group and the performers of the work. The issues under review were evaluated and reported on using each of the eight evaluation criteria identified in NUREG-1297. The report clearly states the issues reviewed and the conclusions reached by the Peer Panel. The report includes provisions for individual statements by peer review group members reflecting dissenting views and comments; however, no dissenting views were identified. The report names the reviewers and provides acceptability information for them in the form of their technical qualifications, completed *Determination of Peer Panel Member Independence* forms, and a certification by the Peer Review Manager regarding the lack of Panel member bias and organizational conflict of interest. The peer review report was signed by each member of the Peer Panel indicating concurrence with the report's findings and conclusions.

A quality assurance surveillance of the first phase peer review was conducted by a representative of the Department. As documented in a subsequent surveillance report (CAFO 2002c, Section 6), no observations or corrective action requests were issued regarding implementation of and compliance with the Carlsbad Field Office Quality Assurance Program criteria for peer reviews. A similar surveillance was not conducted by the Department during the second phase of the review. The Agency believes that a second surveillance was not necessary because a surveillance was conducted during the first phase, the peer review process was essentially unchanged during the second phase,

and the Agency's review of the second phase activities showed that the peer review was appropriately implemented.

It is concluded that with the exception of a minor deficiency related to the peer review plan discussed in Section 3.2 and in Table 2 of this report, the Department's Salado Flow Conceptual Models Peer Review documentation meets the requirements of NUREG-1297 and of the Agency.

5.0 CONCLUSIONS

Although a minor deficiency was found with the Department's peer review plan that should be corrected in future plans, the Salado Flow Conceptual Models Peer Review was adequately conducted in accordance with the requirements of 40 CFR Part 194.27 and with NUREG-1297. The Peer Panel members were appropriately selected and the peer review was implemented and documented in accordance with these requirements.

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Table 1. Requirements Checklist Comparison for Peer Review Procedure CBFO MP 10.5 Rev 4

#	Question	Comment (Objective Evidence)	Result
194.27 Rule Requirements			
1	<p>40 CFR 194.27 "(a) Any compliance application shall include documentation of peer review that has been conducted, in a manner required by this section, for:</p> <p>(1) Conceptual models selected and developed by the Department;</p> <p>(2) Waste characterization analyses as required in Section 194.42(b); and</p> <p>(3) Engineered barrier evaluation as required in Section 194.44."</p> <p>Is this peer review a review of one of the topics listed above?</p>	<p>Yes. This peer review was conducted in response to Requirement 1(1) "Conceptual models selected and developed by the Department." However, the adequacy of documenting this peer review in the compliance application is beyond the scope of this evaluation of the peer review process.</p>	In Compliance
2	<p>40 CFR 194.27 "(b) Peer review processes required in paragraph (a) of this section, and conducted subsequent to the promulgation of this part, shall be conducted in a manner that is compatible with NUREG-1297, "Peer Review for High-Level Nuclear Waste Repositories," published February 1988. (Incorporation by reference as specified in ' 194.5.)"</p> <p>Does the peer review procedure require that the peer review be compatible with NUREG-1297?</p>	<p>Yes. Section 1.0 of the procedure states "This procedure was developed in accordance with and implements the guidance in NUREG-1297, Peer Review for High-Level Nuclear Waste Repositories."</p>	In Compliance
3	<p>40 CFR 194.27 "(c) Any compliance application shall:</p> <p>(1) Include information that demonstrates that peer review processes required in paragraph (a), and conducted prior to the implementation of the promulgation of this part, were conducted in accordance with an alternate process substantially equivalent in effect to NUREG-1297 and approved by the Administrator or the Administrator's authorized representative ..."</p> <p>Is this peer review "substantially equivalent in effect to NUREG-1297" and has the Agency approved the procedures used in this peer review?</p>	<p>Not Applicable. This requirement applies to peer reviews conducted prior to the implementation of the promulgation of 40 CFR 194.27. Because 40 CFR 194.27 was promulgated before the peer review was conducted, this requirement is not applicable.</p>	Not Applicable
4	<p>40 CFR 194.27 "(c) Any compliance application shall:</p> <p>(2) Document any peer review processes conducted in addition to those required pursuant to paragraph (a) of this section. Such documentation shall include formal requests, from the Department to outside review groups or individuals, to review or comment on any information used to support compliance applications, and the responses from such groups or individuals."</p> <p>Does the Department document processes as noted in (2) above?</p>	<p>Not Applicable. This requirement applies to peer reviews conducted to address issues not identified in paragraph (a) of this section (Requirement 1). This requirement is not applicable because the peer review was conducted to address Item (1) in paragraph (a).</p>	Not Applicable

Table 1. Requirements Checklist Comparison for Peer Review Procedure CBFO MP 10.5 Rev 4 (Continued)

#	Question	Comment (Objective Evidence)	Result
	NUREG-1297: Peer Review Requirements		
	Applicability of Peer Review		
5	<p>Is there documentation that the peer review is "used when the adequacy of information or the suitability of procedures and methods essential to showing that the repository system meets or exceeds its performance requirements with respect to safety and waste isolation cannot otherwise be established through testing, alternative calculations or reference to previously established standards and practices?"</p> <p>NUREG-1297 Section IV. 1. a.</p>	<p>Not Applicable. This peer review was mandated by the Agency. Additional documentation justifying applicability of the peer review process is not required.</p>	<p>Not Applicable</p>
6	<p>Is there documentation that the peer review is being conducted in response to one or more of the following conditions?</p> <p>(a) Critical interpretations or decisions will be made in the face of significant uncertainty, including the planning for data collection, research, or exploratory testing</p> <p>(b) Decisions or interpretations having significant impact on performance assessment conclusions</p> <p>(c) Novel or beyond the state-of-the art testing, plans and procedures, or analyses are or will be utilized</p> <p>(d) Detailed technical criteria or standard industry procedures do not exist or are being developed</p> <p>(e) Results of test are not reproducible or repeatable</p> <p>(f) Data or interpretation are ambiguous</p> <p>(g) Data adequacy is questionable - such as, data may not have been collected in conformance with an established QA program</p> <p>NUREG-1297 Section IV. 1. b.</p>	<p>Not Applicable. This peer review was mandated by the Agency. Additional documentation justifying applicability of the peer review process is not required.</p>	<p>Not Applicable</p>
7	<p>Is this peer review being performed because the adequacy of a critical body of information can be established by alternate means, but there is disagreement within the cognizant technical community regarding the applicability or appropriateness of the alternate means?</p> <p>NUREG-1297 Section IV. 1. c</p>	<p>Not Applicable. This peer review was mandated by the Agency. Additional documentation justifying applicability of the peer review process is not required.</p>	<p>Not Applicable</p>

Table 1. Requirements Checklist Comparison for Peer Review Procedure CBFO MP 10.5 Rev 4 (Continued)

#	Question	Comment (Objective Evidence)	Result
	NUREG-1297: Peer Review Requirements (Continued)		
	Structure of Peer Review Group		
8	<p>(a) Is the size of the peer review group consistent with the complexity, importance, and uncertainty of the work reviewed?</p> <p>(b) Does the collective technical expertise and qualifications of the peer review group members span the technical issues and areas involved in the work reviewed, including differing bodies of scientific thought?</p> <p>(c) Is the representation of the peer review group proportional to the technical areas more central to the work to be reviewed?</p> <p>(d) Does the peer review group represent major schools of scientific thought?</p> <p>(e) Has the potential for partiality been minimized by selection of peers to provide balance in the peer review group?</p> <p>NUREG-1297 Section IV. 2</p>	<p>Addressed. Section I-2.1.2 of the procedure states in part "The number of peers comprising a peer review panel varies with the complexity of the work to be reviewed, its importance for establishing that safety or waste isolation performance goals are met, the number of technical disciplines involved, the degree to which uncertainties in the data or technical approach exist, ..."</p> <p>Addressed. Section I-2.1.3 of the procedure states "The collective technical expertise and qualifications of peer review panel members shall span the issues and areas involved in the work to be reviewed, including any differing bodies of scientific thought."</p> <p>Addressed. Section I-2.1.3 of the procedure states "Technical areas more central to the work to be reviewed shall receive proportionally more representation on the peer review panel."</p> <p>Addressed. Section I-2.1.3 of the procedure states "The peer review panel should represent the major schools of scientific thought ..."</p> <p>Addressed. Section I-2.1.3 of the procedure states "... the potential for technical or organizational partiality should be minimized by selecting peers to provide a balanced peer review panel."</p>	<p>In Compliance</p> <p>In Compliance</p> <p>In Compliance</p> <p>In Compliance</p> <p>In Compliance</p>
	<u>Acceptability of Peers</u>		
9	<p>Technical Requirement: Does each reviewer have recognized and verifiable technical credentials in the technical area covered?</p> <p>NUREG-1297 Section IV. 3. a.</p>	<p>Addressed. Section I-2.2.2A of the procedure states "The panel member shall have recognized and verifiable technical credentials in the technical area that he or she has been selected to cover."</p>	<p>In Compliance</p>

Table 1. Requirements Checklist Comparison for Peer Review Procedure CBFO MP 10.5 Rev 4 (Continued)

#	Question	Comment (Objective Evidence)	Result
NUREG-1297: Peer Review Requirements (Continued)			
10	<p>(a) Independence Requirement: Is the peer review group independent of the original work to be reviewed?</p> <p>(b) For peer review group members not totally independent, is an adequate documented rationale provided?</p> <p>NUREG-1297 Section IV. 3. b.</p>	<p>Addressed. Section I-2.2.3A of the procedure states "Peer review panel members shall be independent of the original work that is to be reviewed."</p> <p>Addressed. Section I-2.2.3B of the procedure states "In those cases where total independence requirements cannot be met, a documented rationale as to why someone of equivalent technical qualifications and greater independence, if applicable, was not selected shall be documented in a memo to file and included in the QA record package."</p>	<p>In Compliance</p> <p>In Compliance</p>
Peer Review Process			
11	<p>Does the peer review group chairperson determine the peer review process used?</p> <p>NUREG-1297 Section IV. 4.</p>	<p>Addressed. Sections I-6.2.5 and I-6.2.6 of the procedure state "The peer review chairperson shall provide technical leadership of the peer review panel members." and "The peer review chairperson shall delegate, with the assistance of the peer review manager, the assignments of specific review tasks and activities among peer review panel members." The level of responsibility of the panel chairperson is compatible with NUREG-1297. See text discussion in Section 2.0.</p>	<p>In Compliance</p>
12	<p>Does the peer review group evaluate and report on the following?</p> <p>(a) validity of assumptions;</p> <p>(b) alternate interpretations;</p> <p>(c) uncertainty of results and consequences if wrong;</p> <p>(d) appropriateness and limitations of methodology and procedures;</p> <p>(e) adequacy of application;</p> <p>(f) accuracy of calculations;</p> <p>(g) validity of conclusions;</p> <p>(h) adequacy of requirements and criteria.</p> <p>NUREG-1297 Section IV. 4.</p>	<p>Partially Addressed. Section I-6.2.2 of the procedure states "The peer review process shall consist of an in-depth analysis and evaluation of documented assumptions, calculations, extrapolations, alternate interpretations, methodology, acceptance criteria employed, [and] the conclusions drawn in the original work in accordance with approved technical and quality assurance requirements, and the applicable peer review plan(s)." The scope identified in the the Department procedure does not include (c) uncertainty of results and consequences if wrong; or (e) adequacy of application and is not compatible with NUREG-1297. See text discussion in Section 2.0.</p>	<p>Not in Compliance</p>

Table 1. Requirements Checklist Comparison for Peer Review Procedure CBFO MP 10.5 Rev 4 (Continued)

#	Question	Comment (Objective Evidence)	Result
NUREG-1297: Peer Review Requirements (Continued)			
13	<p>Does the peer review process show that full and frank discussions between the peer review group and the performers of the work are encouraged?</p> <p>NUREG-1297 Section IV. 4.</p>	<p>Addressed. Section 5.2.5 of the procedure states "The assistant manager (or designee) shall provide the required interfaces to ensure an effective and responsive flow of information and logistic support for the expedient, independent, and timely conduct of the peer review process." This stipulation is essentially repeated in Section I-6.2.8 of the procedure. The phrase "effective and responsive flow of information" is essentially equivalent to the phrase "full and frank discussions" and is therefore compatible with NUREG-1297.</p>	In Compliance
14	<p>Are procedures developed for the peer review process?</p> <p>NUREG-1297 Section IV. 4.</p>	<p>Yes. The Department's CBFO MP 10.5 was developed for the peer review process.</p>	In Compliance
15	<p>Are written minutes of meetings, deliberations, and activities of the peer review group prepared?</p> <p>NUREG-1297 Section IV. 4.</p>	<p>Addressed. Section 6.1.1(J) of the procedure states that the peer review QA records will include "Written minutes of meetings, deliberations, and activities."</p>	In Compliance
16	<p>Do procedures provide methods for initiating a peer review?</p> <p>NUREG-1297 Section IV. 4.</p>	<p>Yes. Section 5.1 of the procedure, entitled "Initiating the Peer Review Process," provides methods for initiating a peer review.</p>	In Compliance
17	<p>Do procedures require a planning document that describes the work reviewed, the size and spectrum of the peer review group, the method chosen, and the schedule?</p> <p>NUREG-1297 Section IV. 4.</p>	<p>Yes. Section I-6.1 of the procedure, entitled "Peer Review Plan," addresses preparation of a peer review plan. Section I-6.1.2 of the procedure states "The peer review plan shall contain, at a minimum:</p> <ul style="list-style-type: none"> A. The scope of the peer review and description of the work to be reviewed B. The intended use of the work in performance assessment (if applicable) C. The composition of the peer review panel D. Any suggested methods (e.g., the method used to document observations, comments, and conclusions) E. The schedule to complete the peer review report F. The frequency of status reports" 	In Compliance

Table 1. Requirements Checklist Comparison for Peer Review Procedure CBFO MP 10.5 Rev 4 (Continued)

#	Question	Comment (Objective Evidence)	Result
	NUREG-1297: Peer Review Requirements (Continued)		
	Peer Review Report		
18	Is a written report documenting the results of the peer review issued and signed by each member of the peer review group? NUREG-1297 Section IV. 5.	Addressed. Section I-6.4 of the procedure, entitled "Peer Review Report," addresses preparation of a peer review report. Section I-6.4.2 of the procedure states in part "The peer review report shall: A. Be signed by each peer review panel member B. Describe the work or issue that was reviewed C. Describe the conclusions reached by the peer review panel"	In Compliance
19	Does the report clearly state the work or issue reviewed and the conclusions reached by the peer review process? NUREG-1297 Section IV. 5.	Addressed. Section I-6.4.2 of the procedure states in part "The peer review report shall: B. Describe the work or issue that was reviewed C. Describe the conclusions reached by the peer review panel"	In Compliance
20	Does the report include individual statements by peer review group members reflecting dissenting views and comments, as appropriate? NUREG-1297 Section IV. 5.	Addressed. Section I-6.4.2 of the procedure states in part "The peer review report shall: D. Provide individual statements by the peer review panel members reflecting dissenting views or additional comments, as appropriate"	In Compliance
21	Does the report contain a listing of the reviewers and any acceptability information for each member of the peer review group, including potential technical and/or organizational partiality NUREG-1297 Section IV. 5.	Addressed. Section I-6.4.2 of the procedure states in part "The peer review report shall: E. List the peer review panel members and provide acceptability information (i.e., technical qualifications and independence) for each member including any potential technical and or organizational partiality"	In Compliance
	NUREG Discussion		
22	Does the QA organization provide surveillance of the peer review process to ensure that procedures conform to NUREG-1297 and that they are followed by the peer review group? NUREG-1297 Section V.	Addressed. Section I-7.1 of the procedure states "The CBFO QA Manager shall conduct assessments of the peer review process to ensure that all aspects of the peer review process conform to this procedure."	In Compliance
23	Is this peer review used in a confirmatory sense? NUREG-1297 Section V.	Not Applicable. Specific applications of peer reviews are not within the scope of the procedure.	Not Applicable

Table 2. Requirements Checklist Comparison for the Salado Flow Peer Review Plan

#	Question	Comment (Objective Evidence)	Result
194.27 Rule Requirements			
1	<p>40 CFR 194.27 "(a) Any compliance application shall include documentation of peer review that has been conducted, in a manner required by this section, for:</p> <p>(1) Conceptual models selected and developed by the Department;</p> <p>(2) Waste characterization analyses as required in Section 194.42(b); and</p> <p>(3) Engineered barrier evaluation as required in Section 194.44."</p> <p>Is this peer review a review of one of the topics listed above?</p>	<p>Yes. Section 1 Para 1 of the plan states "This peer review plan describes the process and documentation requirements for a peer review of the proposed changes to the Salado flow conceptual models used in the Waste Isolation Pilot Plant (WIPP) performance assessment (PA)." However, the adequacy of documenting this peer review in the compliance application is beyond the scope of this evaluation of the peer review process.</p>	In Compliance
2	<p>40 CFR 194.27 "(b) Peer review processes required in paragraph (a) of this section, and conducted subsequent to the promulgation of this part, shall be conducted in a manner that is compatible with NUREG-1297, "Peer Review for High-Level Nuclear Waste Repositories," published February 1988. (Incorporation by reference as specified in ' 194.5.)"</p> <p>Does the peer review procedure require that the peer review be compatible with NUREG-1297?</p>	<p>Yes. Section 1.3 Para 1 of the plan states "The peer review shall be performed in a manner that meets all the requirements of NUREG-1297, as required by 40 CFR 194.27(b)." Section 2.1 Bullet 1 of the plan further states "In the event of a conflict between MP 10.5 and NUREG-1297, NUREG-1297 will take precedence over MP 10.5."</p>	In Compliance
3	<p>40 CFR 194.27 "(c) Any compliance application shall:</p> <p>(1) Include information that demonstrates that peer review processes required in paragraph (a), and conducted prior to the implementation of the promulgation of this part, were conducted in accordance with an alternate process substantially equivalent in effect to NUREG-1297 and approved by the Administrator or the Administrator's authorized representative ..."</p> <p>Is this peer review "substantially equivalent in effect to NUREG-1297" and has the Agency approved the procedures used in this peer review?</p>	<p>Not Applicable. This requirement applies to peer reviews conducted prior to the implementation of the promulgation of 40 CFR 194.27. Because 40 CFR 194.27 was promulgated before the peer review was conducted, this requirement is not applicable.</p>	Not Applicable
4	<p>40 CFR 194.27 "(c) Any compliance application shall:</p> <p>(2) Document any peer review processes conducted in addition to those required pursuant to paragraph (a) of this section. Such documentation shall include formal requests, from the Department to outside review groups or individuals, to review or comment on any information used to support compliance applications, and the responses from such groups or individuals."</p> <p>Does the Department document processes as noted in (2) above?</p>	<p>Not Applicable. This requirement applies to peer reviews conducted to address issues not identified in paragraph (a) of this section (Requirement #1). This requirement is not applicable because the peer review was conducted to address item (1) in paragraph (a).</p>	Not Applicable

Table 2. Requirements Checklist Comparison for the Salado Flow Peer Review Plan (Continued)

#	Question	Comment (Objective Evidence)	Result
	NUREG-1297: Peer Review Requirements		
	Applicability of Peer Review		
5	<p>Is there documentation that the peer review is "used when the adequacy of information or the suitability of procedures and methods essential to showing that the repository system meets or exceeds its performance requirements with respect to safety and waste isolation cannot otherwise be established through testing, alternative calculations or reference to previously established standards and practices?"</p> <p>NUREG-1297 Section IV. 1. a.</p>	<p>Not Applicable. This peer review was mandated by the Agency. Additional documentation justifying applicability of the peer review process is not required.</p>	<p>Not Applicable</p>
6	<p>Is there documentation that the peer review is being conducted in response to one or more of the following conditions?</p> <p>(a) Critical interpretations or decisions will be made in the face of significant uncertainty, including the planning for data collection, research, or exploratory testing</p> <p>(b) Decisions or interpretations having significant impact on performance assessment conclusions</p> <p>(c) Novel or beyond the state-of-the art testing, plans and procedures, or analyses are or will be utilized</p> <p>(d) Detailed technical criteria or standard industry procedures do not exist or are being developed</p> <p>(e) Results of test are not reproducible or repeatable</p> <p>(f) Data or interpretation are ambiguous</p> <p>(g) Data adequacy is questionable - such as, data may not have been collected in conformance with an established QA program</p> <p>NUREG-1297 Section IV. 1. b.</p>	<p>Not Applicable. This peer review was mandated by the Agency. Additional documentation justifying applicability of the peer review process is not required.</p>	<p>Not Applicable</p>
7	<p>Is this peer review being performed because the adequacy of a critical body of information can be established by alternate means, but there is disagreement within the cognizant technical community regarding the applicability or appropriateness of the alternate means?</p> <p>NUREG-1297 Section IV. 1. c</p>	<p>Not Applicable. This peer review was mandated by the Agency. Additional documentation justifying applicability of the peer review process is not required.</p>	<p>Not Applicable</p>

Table 2. Requirements Checklist Comparison for the Salado Flow Peer Review Plan (Continued)

#	Question	Comment (Objective Evidence)	Result
NUREG-1297: Peer Review Requirements (Continued)			
Structure of Peer Review Group			
8	<p>(a) Is the size of the peer review group consistent with the complexity, importance, and uncertainty of the work reviewed?</p> <p>(b) Does the collective technical expertise and qualifications of the peer review group members span the technical issues and areas involved in the work reviewed, including differing bodies of scientific thought?</p> <p>(c) Is the representation of the peer review group proportional to the technical areas more central to the work to be reviewed?</p> <p>(d) Does the peer review group represent major schools of scientific thought?</p> <p>(e) Has the potential for partiality been minimized by selection of peers to provide balance in the peer review group?</p> <p>NUREG-1297 Section IV. 2</p>	<p>Addressed by Reference. Section 2.1 Bullet 1 of the plan states that the peer review will be conducted following MP 10.5 requirements. Requirement 8(a) is adequately addressed in Section I-2.1.2 of MP 10.5. See Table 1.</p> <p>Addressed by Reference. Section 2.1 Bullet 1 of the plan states that the peer review will be conducted following MP 10.5 requirements. Requirements 8(b), 8(c), 8(d), and 8(e) are adequately addressed in Section I-2.1.3 of MP 10.5. See Table 1.</p>	<p>In Compliance</p> <p>In Compliance</p> <p>In Compliance</p> <p>In Compliance</p> <p>In Compliance</p>
Acceptability of Peers			
9	<p>Technical Requirement: Does each reviewer have recognized and verifiable technical credentials in the technical area covered?</p> <p>NUREG-1297 Section IV. 3. a.</p>	<p>Addressed by Reference. Section 2.1 Bullet 1 of the plan states that the peer review will be conducted following MP 10.5 requirements. Requirement 9 is adequately addressed in Section I-2.2.2A of MP 10.5. See Table 1.</p>	<p>In Compliance</p>

Table 2. Requirements Checklist Comparison for the Salado Flow Peer Review Plan (Continued)

#	Question	Comment (Objective Evidence)	Result
NUREG-1297: Peer Review Requirements (Continued)			
10	<p>(a) Independence Requirement: Is the peer review group independent of the original work to be reviewed?</p> <p>(b) For peer review group members not totally independent, is an adequate documented rationale provided?</p> <p>NUREG-1297 Section IV. 3. b.</p>	<p>Addressed. Section 1.1 Para 4 of the plan states "The peer reviewers shall be independent of the work being reviewed..." However, the peer review panel's independence from the Department's influence is potentially compromised by the following statement in Section 2.2 Para 5 of the plan: "At the request of the DOE CBFO Assistant Manager, or designee, a draft of this report [the peer review report] may be provided to DOE CBFO for comment prior to finalization. However, to ensure the independence of the panel's conclusions, DOE CBFO comments are for information only." See text discussion in Section 3.0.</p> <p>Addressed by Reference. Section 2.1 Bullet 1 of the plan states that the peer review will be conducted following MP 10.5 requirements. Requirement 10(b) is adequately addressed in Section I-2.2.3B of MP 10.5. See Table 1.</p>	<p>Not in Compliance</p> <p>In Compliance</p>
Peer Review Process			
11	<p>Does the peer review group chairperson determine the peer review process used?</p> <p>NUREG-1297 Section IV. 4.</p>	<p>Addressed by Reference. Section 2.1 Bullet 1 of the plan states that the peer review will be conducted following MP 10.5 requirements. Requirement 11 is adequately addressed in Sections I-6.2.5 and I-6.2.6 of MP 10.5. See Table 1 and text discussion in Section 2.0.</p>	<p>In Compliance</p>
12	<p>Does the peer review group evaluate and report on the following?</p> <p>(a) validity of assumptions;</p> <p>(b) alternate interpretations;</p> <p>(c) uncertainty of results and consequences if wrong;</p> <p>(d) appropriateness and limitations of methodology and procedures;</p> <p>(e) adequacy of application;</p> <p>(f) accuracy of calculations;</p> <p>(g) validity of conclusions;</p> <p>(h) adequacy of requirements and criteria.</p> <p>NUREG-1297 Section IV. 4.</p>	<p>Partially Addressed. Section 2.2 Para 3 of the plan states "The peer panel shall perform their review using the adequacy criteria discussed in Section 2.3 as a guide. The scope of this peer review is only for changes to conceptual models that were peer reviewed previously; therefore, many of the adequacy criteria are not subject to peer review due to their prior evaluation." Section 2.3 Para 1 of the plan repeats all eight NUREG-1297 evaluation and reporting criteria verbatim but identifies them as guidance rather than requirements. See text discussion in Section 3.0.</p>	<p>Not in Compliance</p> <p>Found to be in compliance during Peer Review Implementation. See Table 3</p>

Table 2. Requirements Checklist Comparison for the Salado Flow Peer Review Plan (Continued)

#	Question	Comment (Objective Evidence)	Result
	NUREG-1297: Peer Review Requirements (Continued)		
13	Does the peer review process show that full and frank discussions between the peer review group and the performers of the work are encouraged? NUREG-1297 Section IV. 4.	Addressed. Section 2.2 Para 3 of the plan states "... the peer review panel is free to comment and analyze impacts, as appropriate, to complete their review." Section 2.2 Para 4 of the plan states "Throughout the review, the panel is encouraged to engage in frank discussions with the individuals responsible for the work under review." These statements are compatible with and adequately address the intent of Requirement 13	In Compliance
14	Are procedures developed for the peer review process? NUREG-1297 Section IV. 4.	Yes. the Department's CBFO MP 10.5 was developed for the peer review process. Section 2.1 Bullet 1 of the plan states that the peer review will be conducted following MP 10.5 requirements.	In Compliance
15	Are written minutes of meetings, deliberations, and activities of the peer review group prepared? NUREG-1297 Section IV. 4.	Addressed. Section 2.1 of the plan states in part that the peer review panel will "Conduct and document peer review caucuses." In addition, Section 4 of the plan, entitled "Records Management," states in part "Records generated as a result of peer review activities defined in this peer review plan and designated as QA records shall be maintained by the peer review manager ... and include: 1. Meeting minutes and presentation materials 2. Written materials presented to the Peer Review Panel by CBFO or investigators 3. Written information presented to the peer review panel members by observers"	In Compliance
16	Do procedures provide methods for initiating a peer review? NUREG-1297 Section IV. 4.	Addressed by Reference. Section 2.1 Bullet 1 of the plan states that the peer review will be conducted following MP 10.5 requirements. Requirement 16 is adequately addressed in Section 5.1 of the procedure, entitled "Initiating the Peer Review Process." See Table 1.	In Compliance

Table 2. Requirements Checklist Comparison for the Salado Flow Peer Review Plan (Continued)

#	Question	Comment (Objective Evidence)	Result
	NUREG-1297: Peer Review Requirements (Continued)		
17	<p>Do procedures require a planning document that describes the work reviewed, the size and spectrum of the peer review group, the method chosen, and the schedule?</p> <p>NUREG-1297 Section IV. 4.</p>	<p>Yes. Section I-6.1 of the procedure, entitled "Peer Review Plan," addresses the preparation of a peer review plan. The document Salado Flow Peer Review Plan was prepared by the Department in response to this requirement. The plan describes the work reviewed (Section 2.1.1), the size and spectrum of the peer review group (Section 2.1.2), the method chosen (Sections 2.2 and 2.3), and the schedule (Sections 2.4 and 2.5).</p>	In Compliance
	Peer Review Report		
18	<p>Is a written report documenting the results of the peer review issued and signed by each member of the peer review group?</p> <p>NUREG-1297 Section IV. 5.</p>	<p>Addressed. Section 2.1 Bullet 6 of the plan requires the peer review panel to "Produce a formal written report of the peer review findings and conclusions." In addition, Section 2.5.1 of the plan states in part "The peer review report shall, as a minimum:</p> <ol style="list-style-type: none"> 1. Be signed by each peer review panel member 2. Describe the work or issues that were reviewed 3. Describe the conclusions reached by the peer review panel (e.g., peer review panel observation comments and overall conclusions)." 	In Compliance
19	<p>Does the report clearly state the work or issue reviewed and the conclusions reached by the peer review process?</p> <p>NUREG-1297 Section IV. 5.</p>	<p>Addressed. Section 2.5.1 of the plan states in part "The peer review report shall, as a minimum:</p> <ol style="list-style-type: none"> 1. Describe the work or issues that were reviewed 2. Describe the conclusions reached by the peer review panel (e.g., peer review panel observation comments and overall conclusions)" 	In Compliance
20	<p>Does the report include individual statements by peer review group members reflecting dissenting views and comments, as appropriate?</p> <p>NUREG-1297 Section IV. 5.</p>	<p>Addressed. Section 2.5.1 of the plan states in part "The peer review report shall, as a minimum:</p> <ol style="list-style-type: none"> 1. Provide additional statements by the peer review panel members reflecting dissenting views or additional comments, as appropriate" 	In Compliance

Table 2. Requirements Checklist Comparison for the Salado Flow Peer Review Plan (Continued)

21	<p>Does the report contain a listing of the reviewers and any acceptability information for each member of the peer review group, including potential technical and/or organizational partiality</p> <p>NUREG-1297 Section IV. 5.</p>	<p>Addressed by Reference. Section 2.1 Bullet 1 of the plan states that the peer review will be conducted following MP 10.5 requirements. Requirement 21 is adequately addressed in Section I-6.4.2 of the procedure. See Table 1. In addition, Section 2.5.1 of the plan states in part "The peer review report shall, as a minimum:</p> <ol style="list-style-type: none"> 1. List the peer review panel members and provide acceptability information (i.e., technical qualifications and independence) for each member." 	In Compliance
NUREG Discussion			
22	<p>Does the QA organization provide surveillance of the peer review process to ensure that procedures conform to NUREG-1297 and that they are followed by the peer review group?</p> <p>NUREG-1297 Section V.</p>	<p>Addressed by Reference. Section 2.1 Bullet 1 of the plan states that the peer review will be conducted following MP 10.5 requirements. Requirement 22 is adequately addressed in Section I-7.1 of the procedure. See Table 1. However, Section 3 of the plan states "The DOE CBFO QA Manager may appoint a QA observer to attend the peer review orientation, the peer review training, and peer review meetings. The DOE CBFO QA Manager may schedule an assessment or audit of the contractor's peer review process and records prior to completion of the review." Although the plan does not reiterate the procedure's requirement that QA surveillance be conducted, the primacy of the procedure over the plan provides adequate evidence of intent to comply with this NUREG requirement.</p>	In Compliance
23	<p>Is this peer review used in a confirmatory sense?</p> <p>NUREG-1297 Section V.</p>	<p>Addressed. Section 1.1 Para 1 of the plan states "... a peer review is needed to determine whether revisions to selected Salado flow conceptual models that were developed for the Compliance Certification Application (CCA) ... reasonably represent the disposal system."</p>	In Compliance

Table 3. Requirements Checklist Comparison for the Salado Flow Peer Review Implementation

#	Question	Comment (Objective Evidence)	Result
194.27 Rule Requirements			
1	<p>40 CFR 194.27 "(a) Any compliance application shall include documentation of peer review that has been conducted, in a manner required by this section, for:</p> <p>(1) Conceptual models selected and developed by the Department;</p> <p>(2) Waste characterization analyses as required in Section 194.42(b); and</p> <p>(3) Engineered barrier evaluation as required in Section 194.44."</p> <p>Is this peer review a review of one of the topics listed above?</p>	<p>Yes. The Salado Flow Conceptual Models Peer Review Report prepared by the peer review panel and the supporting quality assurance documentation satisfy this requirement.</p>	<p>In Compliance</p>
2	<p>40 CFR 194.27 "(b) Peer review processes required in paragraph (a) of this section, and conducted subsequent to the promulgation of this part, shall be conducted in a manner that is compatible with NUREG-1297, "Peer Review for High-Level Nuclear Waste Repositories," published February 1988. (Incorporation by reference as specified in ' 194.5.)"</p> <p>Does the peer review procedure require that the peer review be compatible with NUREG-1297?</p>	<p>Yes. Section 1.0 of CBFO MP 10.5 Rev 4 states "This procedure was developed in accordance with and implements the guidance in NUREG-1297, Peer Review for High-Level Nuclear Waste Repositories." Section 1.0 of the peer review report reiterates that the peer review was conducted in accordance with the procedure and also in accordance with NUREG-1297.</p>	<p>In Compliance</p>
3	<p>40 CFR 194.27 "(c) Any compliance application shall:</p> <p>(1) Include information that demonstrates that peer review processes required in paragraph (a), and conducted prior to the implementation of the promulgation of this part, were conducted in accordance with an alternate process substantially equivalent in effect to NUREG-1297 and approved by the Administrator or the Administrator's authorized representative ..."</p> <p>Is this peer review "substantially equivalent in effect to NUREG-1297" and has the Agency approved the procedures used in this peer review?</p>	<p>Not Applicable. This requirement applies to peer reviews conducted prior to the implementation of the promulgation of 40 CFR 194.27. Because 40 CFR 194.27 was promulgated before the peer review was conducted, this requirement is not applicable.</p>	<p>Not Applicable</p>
4	<p>40 CFR 194.27 "(c) Any compliance application shall:</p> <p>(2) Document any peer review processes conducted in addition to those required pursuant to paragraph (a) of this section. Such documentation shall include formal requests, from the Department to outside review groups or individuals, to review or comment on any information used to support compliance applications, and the responses from such groups or individuals."</p> <p>Does the Department document processes as noted in (2) above?</p>	<p>Not Applicable. This requirement applies to peer reviews conducted to address issues not identified in paragraph (a) of this section (Requirement #1). This requirement is not applicable because the peer review was conducted to address item (1) in paragraph (a).</p>	<p>Not Applicable</p>

Table 3. Requirements Checklist Comparison for the Salado Flow Peer Review Implementation (Continued)

#	Question	Comment (Objective Evidence)	Result
	NUREG-1297: Peer Review Requirements		
	Applicability of Peer Review		
5	<p>Is there documentation that the peer review is "used when the adequacy of information or the suitability of procedures and methods essential to showing that the repository system meets or exceeds its performance requirements with respect to safety and waste isolation cannot otherwise be established through testing, alternative calculations or reference to previously established standards and practices?"</p> <p>NUREG-1297 Section IV. 1. a.</p>	<p>Not Applicable. This peer review was mandated by the Agency. Additional documentation justifying applicability of the peer review process is not required.</p>	<p>Not Applicable</p>
6	<p>Is there documentation that the peer review is being conducted in response to one or more of the following conditions?</p> <p>(a) Critical interpretations or decisions will be made in the face of significant uncertainty, including the planning for data collection, research, or exploratory testing</p> <p>(b) Decisions or interpretations having significant impact on performance assessment conclusions</p> <p>(c) Novel or beyond the state-of-the art testing, plans and procedures, or analyses are or will be utilized</p> <p>(d) Detailed technical criteria or standard industry procedures do not exist or are being developed</p> <p>(e) Results of test are not reproducible or repeatable</p> <p>(f) Data or interpretation are ambiguous</p> <p>(g) Data adequacy is questionable - such as, data may not have been collected in conformance with an established QA program</p> <p>NUREG-1297 Section IV. 1. b.</p>	<p>Not Applicable. This peer review was mandated by the Agency. Additional documentation justifying applicability of the peer review process is not required.</p>	<p>Not Applicable</p>
7	<p>Is this peer review being performed because the adequacy of a critical body of information can be established by alternate means, but there is disagreement within the cognizant technical community regarding the applicability or appropriateness of the alternate means?</p> <p>NUREG-1297 Section IV. 1. c</p>	<p>Not Applicable. This peer review was mandated by the Agency. Additional documentation justifying applicability of the peer review process is not required.</p>	<p>Not Applicable</p>

Table 3. Requirements Checklist Comparison for the Salado Flow Peer Review Implementation (Continued)

#	Question	Comment (Objective Evidence)	Result
NUREG-1297: Peer Review Requirements (Continued)			
Structure of Peer Review Group			
8	<p>(a) Is the size of the peer review group consistent with the complexity, importance, and uncertainty of the work reviewed?</p> <p>(b) Does the collective technical expertise and qualifications of the peer review group members span the technical issues and areas involved in the work reviewed, including differing bodies of scientific thought?</p> <p>(c) Is the representation of the peer review group proportional to the technical areas more central to the work to be reviewed?</p> <p>(d) Does the peer review group represent major schools of scientific thought?</p> <p>(e) Has the potential for partiality been minimized by selection of peers to provide balance in the peer review group?</p> <p>NUREG-1297 Section IV. 2</p>	<p>Yes. The Peer Reviewer Selection/Non-Selection Justification Form included in the quality assurance documentation identifies the scope of the review and the principal focus of the review on hydrogeological issues. In addition to covering the range of technical disciplines required for the review, each of the three panel members had expertise in hydrology.</p> <p>Yes. The technical qualifications of the three panel members are presented in Appendix A of the peer review report. The collective technical expertise and qualifications of the members was found to adequately span the technical issues and areas involved in the review. No significant differences in scientific thought are known to exist regarding the technical issues under review.</p> <p>Yes. In addition to other areas of expertise, each of the peer reviewers had expertise in hydrogeology which was more central to the work reviewed.</p> <p>Addressed. No significant differences in scientific thought are known to exist regarding the technical issues under review.</p> <p>Yes. An affidavit describing appropriate steps that were taken to help assure a lack of bias and organizational conflict of interest among the peer panel members was prepared by the Peer Review Manager and presented in Appendix C of the peer review report.</p>	<p>In Compliance</p> <p>In Compliance</p> <p>In Compliance</p> <p>In Compliance</p> <p>In Compliance</p>
Acceptability of Peers			
9	<p>Technical Requirement: Does each reviewer have recognized and verifiable technical credentials in the technical area covered?</p> <p>NUREG-1297 Section IV. 3. a.</p>	<p>Yes. The technical credentials of each peer reviewer are presented in Appendix A of the peer review report. An affidavit describing appropriate steps that were taken to review the backgrounds and employment histories of the peer panel members was prepared by the Peer Review Manager and presented in Appendix C of the peer review report. It is noted that each of the panel members also served on the 1996-1997 WIPP CCA conceptual models peer review.</p>	<p>In Compliance</p>

Table 3. Requirements Checklist Comparison for the Salado Flow Peer Review Implementation (Continued)

#	Question	Comment (Objective Evidence)	Result
	NUREG-1297: Peer Review Requirements (Continued)		
10	<p>(a) Independence Requirement: Is the peer review group independent of the original work to be reviewed?</p> <p>(b) For peer review group members not totally independent, is an adequate documented rationale provided?</p> <p>NUREG-1297 Section IV. 3. b.</p>	<p>Yes. Section 1 of the peer review report states "The peer reviewers are independent of the work being reviewed, i.e., the peer reviewers: a) have not been involved as participants, supervisors, technical reviewers, or advisors involved with the work being reviewed, and b) to the extent practical, have sufficient freedom from funding considerations to ensure the work is impartially reviewed." This statement has been confirmed by a review of the Determination of Peer Review panel Member Independence forms and a certification regarding organizational conflicts of interest presented in Appendices A and C of the peer review report. Each of the peer reviewers was a member of the 1996-1997 WIPP CCA conceptual models peer review; however, the peer reviewers are totally independent of the model changes being reviewed at this time.</p> <p>Not Applicable. Each of the peer reviewers is totally independent of the model changes being reviewed at this time.</p>	<p>In Compliance</p> <p>Not Applicable</p>
	Peer Review Process		
11	<p>Does the peer review group chairperson determine the peer review process used?</p> <p>NUREG-1297 Section IV. 4.</p>	<p>Yes. Section 2.2 of the peer review report states "Early in the peer review process Mr. Thies [the Peer Review Manager] appointed a technical panel chairperson, John Gibbons, Ph.D., from among the peer review panel members to serve as the technical leader for the peer review and to lead technical development of the peer review report." Dr. Gibbons' lead role in determining and directing the peer review process was documented in meeting minutes and confirmed by observing his role as spokesperson for the panel during the open meetings, assigning panel member review responsibilities, overseeing panel caucuses, setting meeting schedules, canvassing panel members for additional questions, and speaking for the panel when presenting summaries of panel activities.</p>	<p>In Compliance</p>

Table 3. Requirements Checklist Comparison for the Salado Flow Peer Review Implementation (Continued)

#	Question	Comment (Objective Evidence)	Result
	NUREG-1297: Peer Review Requirements (Continued)		
12	<p>Does the peer review group evaluate and report on the following?</p> <p>(a) validity of assumptions; (b) alternate interpretations; (c) uncertainty of results and consequences if wrong; (d) appropriateness and limitations of methodology and procedures; (e) adequacy of application; (f) accuracy of calculations; (g) validity of conclusions; (h) adequacy of requirements and criteria.</p> <p>NUREG-1297 Section IV. 4.</p>	<p>Yes. The peer review addressed all eight of the NUREG evaluation criteria and appropriately added a ninth criterion, Information Used to Review Changes in Conceptual Model. The final NUREG criterion, Adequacy of Requirements and Criteria, was renamed Adequacy for Implementation by the peer panel. This criterion provides an overall assessment of whether the conceptual model as implemented in performance assessment represents a reasonable approximation of the actual disposal system. The same rewording was used by the original CCA peer review panel and adequately describes the intent of the NUREG criterion.</p>	In Compliance
13	<p>Does the peer review process show that full and frank discussions between the peer review group and the performers of the work are encouraged?</p> <p>NUREG-1297 Section IV. 4.</p>	<p>Yes. Page i of the Executive Summary of the peer review report states "The Peer Review Panel was given access to conceptual model descriptions, scientific reports, briefings, SNL staff, and to the SNL Nuclear Waste Management Program Library. The Panel also had access to reports of prior peer reviews and was given the full cooperation of the DOE and SNL throughout the review."</p>	In Compliance
14	<p>Are procedures developed for the peer review process?</p> <p>NUREG-1297 Section IV. 4.</p>	<p>Yes. The Department's CBFO MP 10.5 was developed for the peer review process. Section 1.0 of the peer review report states that the peer review was conducted following MP 10.5 requirements.</p>	In Compliance
15	<p>Are written minutes of meetings, deliberations, and activities of the peer review group prepared?</p> <p>NUREG-1297 Section IV. 4.</p>	<p>Yes. Written minutes were prepared and are included in the peer review quality assurance documentation.</p>	In Compliance
16	<p>Do procedures provide methods for initiating a peer review?</p> <p>NUREG-1297 Section IV. 4.</p>	<p>Yes. This requirement is adequately addressed in Section 5.1 of the procedure, entitled Initiating the Peer Review Process. See Table 1. Section 1.0 of the peer review report states that the peer review was conducted following MP 10.5 requirements.</p>	In Compliance

Table 3. Requirements Checklist Comparison for the Salado Flow Peer Review Implementation (Continued)

#	Question	Comment (Objective Evidence)	Result
	NUREG-1297: Peer Review Requirements (Continued)		
17	Do procedures require a planning document that describes the work reviewed, the size and spectrum of the peer review group, the method chosen, and the schedule? NUREG-1297 Section IV. 4.	Yes. Section I-6.1 of the procedure, entitled "Peer Review Plan," addresses the preparation of a peer review plan. The document Salado Flow Peer Review Plan was prepared by the Department in response to this requirement. The plan describes the work reviewed (Section 2.1.1), the size and spectrum of the peer review group (Section 2.1.2), the method chosen (Sections 2.2 and 2.3), and the schedule (Sections 2.4 and 2.5).	In Compliance
	Peer Review Report		
18	Is a written report documenting the results of the peer review issued and signed by each member of the peer review group? NUREG-1297 Section IV. 5.	Yes. The document Salado Flow Conceptual Models Peer Review Report, issued in March 2003, describes the results of the peer review and was signed by each member of the peer review panel.	In Compliance
19	Does the report clearly state the work or issue reviewed and the conclusions reached by the peer review process? NUREG-1297 Section IV. 5.	Yes. The report was prepared with separate sections presenting descriptions of the proposed model changes being reviewed and the conclusions reached. In addition, a summary of the conclusions reached by the peer review panel was presented as a separate section of the report.	In Compliance
20	Does the report include individual statements by peer review group members reflecting dissenting views and comments, as appropriate? NUREG-1297 Section IV. 5.	Yes. The report contains separate sections entitled Dissenting Views; however, there were no dissenting views for the conclusions reached on any conceptual model.	In Compliance
21	Does the report contain a listing of the reviewers and any acceptability information for each member of the peer review group, including potential technical and/or organizational partiality NUREG-1297 Section IV. 5.	Yes. The report identifies the reviewers and presents technical qualifications, forms used to determine peer reviewer independence, and a certification regarding the lack of bias or organizational conflict of interest of the peer reviewers.	In Compliance
	NUREG Discussion		
22	Does the QA organization provide surveillance of the peer review process to ensure that procedures conform to NUREG-1297 and that they are followed by the peer review group? NUREG-1297 Section V.	Yes. Quality assurance surveillance of the peer review process was performed by a representative of the Department.	In Compliance

Table 3. Requirements Checklist Comparison for the Salado Flow Peer Review Implementation (Continued)

#	Question	Comment (Objective Evidence)	Result
	NUREG-1297: Peer Review Requirements (Continued)		
23	Is this peer review used in a confirmatory sense? NUREG-1297 Section V.	Yes. The peer review was used to confirm the appropriateness of proposed changes to three Salado flow conceptual models and to confirm that they continue to reasonably represent the WIPP disposal system.	In Compliance