SALADO FLOW PEER REVIEW PLAN

1. INTRODUCTION

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).

1.1 BACKGROUND

Peer review of conceptual models developed by the Department of Energy (DOE) for the WIPP is required by 40 CFR § 194.27 (EPA, 1996), promulgated by the Environmental Protection Agency (EPA). In accordance with this criterion, the Carlsbad Field Office (CBFO) of the DOE will conduct a peer review of specific conceptual models that are being revised due to changes invoked by the regulator or due to knowledge gained since the original conceptual models were developed. More specifically, a peer review is needed to determine whether revisions to selected Salado flow conceptual models that were developed for the Compliance Certification Application (CCA) (DOE, 1996) reasonably represent future states of the disposal system.

Sandia National Laboratories (SNL) is responsible for the development, maintenance, and conduct of WIPP performance assessments. In the PA for the CCA, SNL determined which processes were significant and developed conceptual models that represent possible future states of the disposal system and subsystems. These conceptual models were approved by the EPA during the original WIPP certification (EPA, 1998). Any proposed changes to the previously approved conceptual models must also be peer reviewed to ensure that future states of the disposal system continue to be adequately represented.

There are 24 conceptual models used in the PA. The proposed changes associated with Salado flow processes are expected to affect the following models:

- Disposal System Geometry
- Repository Fluid Flow
- Disturbed Rock Zone (DRZ)

The requirement for conducting a peer review of conceptual models is specified in 40 CFR § 194.27 (a) (1). The requirements for the peer review process and its documentation are specified in 40 CFR § 194.27(b) and (c). In summary, the peer review process shall be a documented, critical review performed by peers who possess qualifications at least equal to those of the individuals who conducted the original work. The peer reviewers shall be independent of the work being reviewed;

independence from the work being reviewed means that the peer: a) was not involved as a participant, supervisor, technical reviewer, or advisor in the work being reviewed, and b) to the extent practical, has sufficient freedom from funding considerations to assure the work is impartially reviewed. Therefore, peer review of the subject matter provides additional assurance to the regulator and the public that the subject matter is reasonable, accurate and valid for its intended use.

1.2 PURPOSE

The purpose of this Plan is to present the plan to perform a peer review of selected Salado flow conceptual models. The process outlined in this plan must result in an independent critical review of the subject matter relevant to the revised conceptual models.

1.3 SCOPE

The Salado Flow Peer Review shall determine if proposed changes to the EPA-approved conceptual models result in revised conceptual models, which reasonably represent possible future states of the disposal system. The peer review shall be performed to meet all the requirements of NUREG-1297 (NRC, 1988), as required by 40 CFR § 194.27(b). The scope of the peer review is limited to assessing the validity of the models that result from these changes.

A peer review is an in-depth critique of assumptions, calculations, extrapolations, alternate interpretations, methodology and acceptance criteria employed, and of the conclusions drawn in the subject work. This Plan defines the management approach, resources, schedule, and technical requirements for using peer reviews to confirm the adequacy of the revised conceptual models.

2. PEER REVIEW PLANNING AND IMPLEMENTATION

2.1 APPROACH

This Plan documents the approach to conducting the peer review process. The Salado Flow Peer Review will be conducted using a rigorous proceduralized approach in accordance with NUREG-1297 (NRC, 1988). The DOE-CBFO has prepared a procedure, MP 10.5 (DOE, 2001a), for conducting peer reviews in accordance with NUREG-1297. The DOE-CBFO procedure ensures that the peer review will be a documented, critical review performed by qualified peers who are independent of the work being reviewed. Specifically the Salado Flow Peer Review Panel will:

- Follow MP 10.5 requirements. In the event of a conflict between MP 10.5 and NUREG-1297, NUREG-1297 will take precedence over MP 10.5.

- Administer and document the peer review process. Activities include documenting the selection of panel members, assignment of a panel leader, panel member independence documentation and recording and archiving meeting minutes.
- Negotiate schedule for the peer review with the DOE-CBFO Assistant Manager (or designee).
- Conduct and document peer review caucuses.
- Communicate interim peer review findings in hardcopy to the DOE-CBFO Assistant Manager (or designee).
- Produce a formal written report of the peer review findings and conclusions.
- Follow QA requirements for document preparation, control and records archiving.

2.1.1 DESCRIPTION OF CONCEPTUAL MODELS TO BE REVIEWED

Changes have been proposed to three of the conceptual models that represent Salado flow. The conceptual models affected are: Disposal System Geometry, Repository Fluid Flow, and the Disturbed Rock Zone (DRZ). The specific changes to these conceptual models are: 1) change of the shaft model in the BRAGFLO grid, 2) a change to the panel closure dimensions to conform to the Option D panel closure design mandated by the EPA, and 3) changes to the repository layout in the BRAGFLO grid. The changes to the conceptual models are the result of the EPA-mandated choice of the Option D panel closure design and a desire to improve the efficiency of the Salado flow computational model (BRAGFLO). Detailed descriptions of these changes will be provided to the peer review panel through written documentation and oral presentations.

The conceptual models under review were approved by the EPA in their certification of compliance (EPA, 1998). As such, the peer review panel is tasked with reviewing the results of the proposed changes to the conceptual models. The peer review panel shall limit the scope of the review as follows:

Changes within the Scope of the Peer Review

- Reviewing the changes to the conceptual models which include:
  - Removal of the shaft as an explicit region in the BRAGFLO grid
  - Modification of the panel closure representation in the BRAGFLO grid to represent the Option D design mandated by the regulators.
  - Changes to repository layout for the number of panel closures in the BRAGFLO grid and for the flaring of the BRAGFLO grid

These changes are expected to change the conceptual models for Disposal System Geometry, Repository Fluid Flow, and the Disturbed Rock Zone.

Items Outside the Scope of the Peer Review

- Validity of the original conceptual models and conceptual model peer reviews
- Reviewing the codes that implement the conceptual models

2.1.2 COMPOSITION OF PEER REVIEW PANEL

The peer review panel will be composed of a minimum of three individuals who possess the subject matter technical expertise to a degree at least equivalent to that needed for the original work. The panel should include personnel who have demonstrated expertise in geologic disposal systems, rock mechanics, and the numerical modeling of fluid flow.

Each panel member will become familiar with the WIPP containment system and the basis of the conceptual models that describe the containment system by reviewing documents on a required reading list and through a formal orientation process. In addition they will be presented a basic description of how the conceptual models for PA are represented in numerical models, algorithms, and codes. The panel members will become familiar with the parameter inputs to the PA codes and the results of prior PAs, sensitivity analyses, and critical comments from previous reviews. Finally, each panel member will become familiar with the peer review process through formal training in the appropriate peer review procedure(s).

2.1.3 LOGISTICS AND MANAGEMENT

Required reading material necessary to support the Salado Flow Peer Review will be provided to the Peer Review Panel. The first technical meeting will be conducted in early May. It may be necessary to conduct the peer review in a phased manner due to the varied subject matter related to the Salado flow conceptual models. The DOE-CBFO Assistant Manager (or designee) will determine the review sequence based upon the availability of the models, technical staff, panel members, and other logistic factors. Flexibility will be required by all supporting organizations to accommodate potential schedule changes.

2.2 PEER REVIEW PROCESS

The DOE-CBFO Assistant Manager (or designee) is responsible for the peer review. Time Solutions Corp. has been selected as the peer review contractor. Mr. John Thies will serve as the contractor Peer Review Manager pending the approval by the DOE-CBFO Assistant Manager (or designee). This Peer Review Plan is submitted to the DOE-CBFO Assistant Manager (or designee) for approval. This Plan meets the

requirements of MP 10.5. It is understood that MP 10.5 shall supersede any discrepancies between this Plan and MP 10.5.

Mr. Thies will not assign a Peer Review Coordinator (per MP 10.5), but will perform the coordination duties with the help of an administrative assistant since the scope of the Salado Flow Peer Review is not expected to be labor intensive.

Mr. Thies will use a selection committee to select candidates for the peer review panel. Upon verification that the peer review panel members meet the criteria outlined in MP 10.5 Attachment 1, an orientation and training meeting will be scheduled for the peer review panel members. The peer review panel members are expected to complete their review of required reading materials prior to the orientation meeting.

The peer review 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. It should also be noted that the validity of the results of the previous peer reviews should not be reviewed as part of this peer review. However, the peer review panel is free to comment, as they feel necessary to complete their review.

Throughout the review, the panel is encouraged to engage in clear and frank discussions with the individuals responsible for the work under review. However, the peer review panel must observe all rules for interaction with DOE-CBFO, SNL and stakeholders outlined in MP 10.5. The results of the Panel's review shall be formally documented in a report.

In addition, MP 10.5 states that the DOE-CBFO QA Manager is authorized to conduct independent assessments of the peer review process to ensure that all aspects of the peer review conform to the guidance of NUREG-1297, MP 10.5, and the latest version of the DOE-CBFO Quality Assurance Program Description (DOE, 1999). The DOE-CBFO QA Manager shall inform the Contractor Peer Review Manager (Mr. Thies) of any EPA requests for audits or assessments. The Contractor Peer Review Manager must comply with and resolve all issues arising from such audits or assessments.

2.3 ADEQUACY CRITERIA

Conceptual models that have been selected and developed by the DOE must meet commonly accepted technical and scientific standards based on an in-depth evaluation. The peer review panel shall use the evaluation criteria in NUREG-1297 as the basis for their review. The evaluation criteria in NUREG-1297 are as follows:

- Validity of assumptions;
- Alternate interpretations;
- Uncertainty of results and consequences if wrong;
- Appropriateness and limitations of methodology and procedures;

- Adequacy of application;
- Accuracy of calculations;
  Validity of conclusions; and
  Adequacy of requirements and criteria.

Additional criteria may be defined by the Panel. For example, the first review panel for conceptual models added a criterion for Information Used to Develop the Conceptual Model. Adequacy of the revised conceptual models will be determined based on whether or not they reasonably represent possible future states of the disposal system.

2.4 SCHEDULE

Attachment A presents a preliminary schedule of peer review activities for the process described in Section 2.1.3. This schedule will serve as the baseline schedule from which requested schedule deviations will be evaluated by Mr. Thies if appropriate. Revisions to the baseline schedule will not require revision to this Plan, but must be approved by the DOE-CBFO Assistant Manager (or designee).

2.5 DELIVERABLES

The Contractor Peer Review Manager shall provide weekly status reports addressing peer review progress against the schedule to the DOE-CBFO Assistant Manager (or designee). The DOE-CBFO Assistant Manager (or designee) shall negotiate all deliverables with the Contractor Peer Review Manager such that timely information is delivered to the panel. A final peer review report is scheduled to be delivered to the DOE-CBFO Peer Review Manager by March 9, 2003.

2.5.1 Peer Review Report

The peer review report shall, as a minimum:

- Be signed by each peer review panel member
- Describe the work or issues that were reviewed
- Describe the conclusions reached by the peer review panel (e.g., the peer review panel observation comments and overall conclusions).
- Provide additional statements by the peer review panel members reflecting dissenting views or additional comments as appropriate
- List the peer review panel members and provide acceptability information (i.e technical qualifications and independence) for each member.

3. QUALITY ASSURANCE

The peer review process will be conducted and documented in a controlled manner and in compliance with the DOE-CBFO Quality Assurance Program Description, CAO-94-1012 and other applicable QA procedures. 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. Upon communication with EPA, the DOE-CBFO QA Manager may schedule any audits or assessments the EPA wishes to perform.

4. RECORDS MANAGEMENT

Records generated as a result of peer review activities defined in this peer review plan and designated as QA records shall be maintained in accordance with DOE-CBFO Management Procedures MP 4.5, Generating, Receiving, Storing, and Controlling Active DOE-CBFO Project Records (DOE, 2001b), and MP 4.9, Quality Assurance Records (DOE, 2001c). Records include items generated by the DOE-CBFO, the peer review Contractor, and SNL and include:

- Salado Flow Peer Review Plan (this document)
- Peer Review Procedure(s)
- Contract documents
- Peer Review Panel Member Verification of Education/Employment Forms
- Determination of Peer Review Panel Member Independence Forms
- Peer Review Panel Selection Justification/Decision Forms
- Peer Review Panel Member Orientation and Training Forms
- Meeting minutes and presentation materials
- Written Materials presented to the Peer Review Panel by DOE-CBFO or investigators
- Written information presented to the Peer Review Panel Members by Observers
- Peer Review Report(s)

QA records shall be maintained by the Contractor Peer Review Manager until completion of the contract with the peer review organization. Duplicate records shall be generated and maintained at separate facilities. Upon completion of the peer review process, the original copy of the QA records (where possible) shall be formally

transferred and delivered to the DOE-CBFO Assistant Manager (or designee) for retention.

5. DOCUMENT CONTROL

All plans, procedures, and other documents that require document control will be processed in accordance with applicable DOE-CBFO controlled document procedures.

6.0 REFERENCES

DOE (U.S. Department of Energy), 1996. Title 40 CFR Part 191 Compliance Certification Application for the Waste Isolation Pilot Plant, DOE/CAO 1996-2184, October 1996.

DOE (U.S. Department of Energy) 1999. Quality Assurance Program Description (QAPD), DOE-CBFO-94-1012, Revision 4, November 2002.

DOE (U.S. Department of Energy), 2001a. Peer Review, DOE-CBFO Management Procedure MP 10.5, Revision 5, February 1, 2003.

DOE (U.S. Department of Energy), 2001b. Quality Assurance Records, DOE-CBFO Management Procedure MP 4.5. February 16, 2001.

DOE (U.S. Department of Energy), 2001c. Quality Assurance Records, DOE-CBFO Management Procedure MP 4.9, Revision 1, March 4, 2001.

DOE (U.S. Department of Energy), 2001d. Document Preparation and Control, DOE-CBFO Management Procedure MP 4.4, Revision 4, January 5, 2001.

DOE (U.S. Department of Energy), 2001e. Document Review, DOE-CBFO Management Procedure MP 4.2, Interim Change Notice (ICN) #1, June 11, 2002.

EPA (U.S. Environmental Protection Agency). 1996. 40 CFR Part 194: Criteria for the Certification and Re-Certification of the Waste Isolation Pilot Plant's Compliance with the 40 CFR Part 191 Disposal Regulations Final Rule. Federal Register, Vol. 61, No. 28, pp.5224-5245, February 9, 1996.

EPA (U.S. Environmental Protection Agency). 1998. 40 CFR Part 194: Criteria for the Certification and Re-certification of the Waste Isolation Pilot Plant's Compliance with the 40 CFR Part 191 Disposal Regulations: Certification Decision; Final Rule. Federal Register, Vol. 63, No. 95, pp. 27353-27406, May 18, 1998.

NRC (U.S. Nuclear Regulatory Commission), 1988. Peer Review for High-level Nuclear Waste Repositories, General Technical Position, NUREG-1297, February 1988.

Prepared by: John A. Thies

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ATTACHMENT A

SALADO FLOW CONCEPTUAL MODEL PEER REVIEW SCHEDULE