BECHTEL SAIC COMPANY, LLC

QA: QA

Paul R. Dixon, Manager
Performance Assessment Project Natural Systems
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ISSUANCE OF DEFICIENCY REPORT (DR) BSC(B)-02-D-110 RESULTING FROM REVIEW OF SOFTWARE DOCUMENTATION

Enclosed is the subject DR generated as a result of review of documentation associated with the implementation of Administrative Procedure AP-SI.1Q, *Software Management*. The condition adverse to quality relates to implementing the use of software prior to completing the baseline documentation for Control Point 1.

Please provide the original copy of the response within 10 working days from the date of this correspondence to Judith E. Gebhart, Bechtel SAIC Company, LLC, 1180 Town Center Drive, Las Vegas, Nevada 89144, with a copy to Deborah G. Opielowski, Navarro Quality Services, P. O. Box 364629, YMSCO Mail Stop 455, North Las Vegas, Nevada 89036-8629.

If you have any questions, please contact either Judith E. Gebhart (702) 295-4788 or Stephen R. Dana at (702) 295-2690.

D. T. Krisha

Donald T. Krisha, Manager
Quality Assurance

5/10/02
Date Signed

REP:bw-0509022599

Enclosure:
DR BSC(B)-02-D-110

Johnson
5/10-11

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

8. ☑ DEFICIENCY REPORT
☐ CORRECTIVE ACTION REPORT
NO.BSC(B)-02-D-110
PAGE 1 OF
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DEFICIENCY REPORT/CORRECTIVE ACTION REPORT

1. Controlling Document: (Document ID and Revision or Date)
AP-SI.1Q REV. 3, ICN 3 12/17/01

2. Related Report No.: NSA 04/29/02
LBNL(B)-02-O-006 & 007

3. Responsible Organization:
BSC Projects

4. Discussed With:
Yu-Shu-Wu, Responsible Manager and Paul Dixon

5. Requirement:
AP-SI.1Q Section 5.2.4 - Implementation is accomplished by developing new software or modifying existing software. Implemenation shall not be started until the Control Point 1 documentation has been baselined in accordance with this procedure.

6. Description of Condition:
During Control Point 1 review of Wingridder v2.0, Tough 2 v1.6 and SZ_Convolute v2.1, there is evidence that demonstrates that the Independent Validation Tester conducted the installation and validation testing of the code prior to submittal of the Control Point 1 documents to the Information Technology Software Management Analyst. Wingridder v2.0 and Tough2 v1.6 Validation Test Plan submitted at Control Point 1 contain a Table to be used to record the status and the results of the test cases conducted during installation and validation testing. However, the results of the test cases (status"Pass", initials of the tester, and the date the tests were conducted) have been entered into the table prior to submittal of the Control Point 1 documentation for review. The Independent Technical Reviewer signature date attesting to the completion of the independent technical review of the VTP was dated 02/28/02 and the RM (continued on continuation page)

Has work been stopped? ☐ Yes ☑ No

7. Initiator:
D. P. Spence & J.E. Gebhart J E Gebhart Dianne P. Spence 04/29/02
Printed Name Signature Date

9. Does a stop work condition exist?
☐ Yes ☑ No ☐ N/A
If Yes, Check One: ☐ A ☐ B ☐ C ☐ D

10. Recommended Actions:
None

11. QA Review: J E Gebhart
JUDITH E GEBHART 5/08/02
Printed Name Signature Date

12. Response Due Date:
10 Working Days after Issuance

13. QAM Issuance Approval:
Printed Name Donald T. Krisha Signature D. T. Krisha Date 5/10/02

14. Corrective Actions Verified/Closure
QAR Printed Name Signature Date

15. QAM Closure Approval:
Printed Name Signature Date

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

☑ DR/CAR/QO
☐ SWO

NO. BSC(B)-02-D-110
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CONDITION ADVERSE TO QUALITY CONTINUATION PAGE

approval signature attesting that independent verifications had been performed and comments resolved was dated 03/05/02. The results of conducting validation tests are to be documented and submitted in the Validation Test Report that is submitted as Control Point 2 after SCM baseline acceptance of Control Point 1 documents. SZ_Convolute RM submitted both Control Point 1 & 2 simultaneously on a CD Rom on 04/02/02 demonstrating that the coding, installation, and validation testing were conducted prior to baseline acceptance of Control Point 1. Refer to attached documentation for Wingridder v2.0, Tough2 v1.6, and SZ_Convolute v2.1.

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VALIDATION TEST PLAN (VTP)
for
TOUGH2 V1.6

SAN: LBNL-2001-214
Document Identifier: 10007-VTP-1.6-00
STN: 10007-1.6-00
SMN: 10007-MED-1.6-00

COPY

Prepared by: _____ Date 3/1/02
Yu-Shu Wu
Responsible Manager

☒ No Comment

Verified by: _____ Date 3/1/02
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Independent Technical Reviewer

Reviewed by: _____ Date 3/4/02
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Management Reviewer

Approved by: _____ Date 3/5/02
Yvonne Tsang
Responsible Manager Supervisor

DPS 04/09/02 Reviewed by ~~Approved by:~~ _____ Date 04/09/02
Dianne Spence
Information Technology
Software Management Analyst (ITSMA)

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CHANGE HISTORY

Revision Number	Effective Date	Description of Change
00-pre ITSMA	02/28/02	Initial issue of this CP1 document prior to ITSMA review.

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This Validation Test Plan (VTP) is based upon Software Activity Plan (SAP) 10007-SAP-1.6-00, the Requirements Document (RD) 10007-RD-1.6-00, and the Design Document (DD) 10007-DD-1.6-00 in accordance Office of Civilian Radioactive Waste Management (OCRWM) Administrative Procedure (AP)-SI.1Q, *Software Management*, Rev. 3, ICN 3. TOUGH2 V1.6 is an upgrade from TOUGH2 V1.4 (STN: 10007-1.4-01).

1. DESCRIPTION OF THE TEST CASES

The qualification documentation for each of the TOUGH2 upgrades builds upon requirements and validation tests defined in existing baselined documents. This phased implementation approach is necessary for research-based codes such as TOUGH2 and requires regression testing of the complete application as enhancements are made or new elements are introduced.

Therefore, this qualification activity shall utilize the existing TOUGH2 V1.4 unit and system tests in conjunction with new tests to verify that the software meets its specified requirements in the RD and operates successfully. New test cases (or modifications to existing tests) have only been included if the TOUGH2 V1.4 tests do not adequately evaluate the new TOUGH2 V1.6 requirements (enhancements) or there are code changes such that the modified software system is not adequately tested on the specified host platform.

The steps to be performed for each test case and a unique identifier for each test case are provided in Table 1. Execution of these test cases will ensure that the software adequately and correctly performs all intended functions and does not perform any unintended functions either by itself or in combination with other functions.

2. ACCEPTANCE/REJECTION CRITERIA

This section provides the acceptance/rejection criteria to be used by the independent validation tester conducting the validation test to determine adequacy of the functions specified in the requirements of the RD as well as the design elements stipulated in the DD for the software.

Table 1 lists the requirements and acceptance criteria that are established to validate TOUGH2 V1.6. The acceptance criteria in Table 1 were developed to test the existing requirements and the enhancements to the code. The qualitative acceptance criterion is that the execution terminates without error.

3. INSTRUCTIONS FOR RUNNING TEST CASES

After installation of TOUGH2 V1.6 (per the ITP), the following steps are to be undertaken for each verification test case.

1). Locate each test case problem on the TOUGH2 V1.6 CD-ROM. The input and output for each test case is located in the directory named "verification_example.dir" within the subdirectory uniquely named for each Test Problem Name as indicated in the last column of Table 1.

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2). Perform each test case. Type in the executable file name, then give the input and output file names in response to the prompt information.
3). Test the resulting output against the specified acceptance criteria.
4). Test is complete when criteria are satisfied.

4. PROVISIONS FOR INDICATING TEST STATUS

Table 1 shall be used to record the status and results of the test. In the table, the independent tester shall use the margin next to each test case number to record results that includes pass/fail annotation with initial and date of tester.

5. ALTERNATIVE VALIDATION METHOD

Not applicable as the validation tests defined in Table 1 are sufficient to ensure that the software product adequately and correctly performs all intended functions and does not perform any unintended functions either by itself or in combination with other functions.

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#	Requirements	Problem Type	Acceptance Criteria	Dimension	Test Problem Name
1 Pass C.H. 01/14/02	Verification of equivalence of TOUGH2 EOS3 V1.6 to V1.4 for using the same input data file. Ensure both versions yield results within the acceptance criteria.	(a) 1-D vertical flow in unsaturated zone (b) Two-phase fluid and heat flow (c) Fractured porous media	Match results of V1.4 (within 0.1% relative error).	1-D, vertical	Test problem#1a and Problem#1 b
2 Pass C.H. 01/14/02	Verification of proper implementation of radiation heat transfer. Ensure Version 1.6 yield results within the acceptance criteria.	Heat transfer in water and gas (two-phase) system at near atmospheric pressure.	Match results of hand-calculation (within 0.1% error).	2 grid blocks (no convection or conduction transfer)	Test Problem #2
3 Pass C.H. 01/14/02	Verification of proper calculation of fracture-liquid saturation dependence of fracture thermal conductivity. Ensure Version 1.6 and V1.4 yield results within the acceptance criteria.	Single-phase water and two-phase flow at near atmospheric pressure.	Match results of hand-calculation (within 0.1% error).	3 fracture-matrix grid blocks	Test Problem#3a and Problem#3b
4 Pass C.H. 01/14/02	Verification of proper implementation of effects of lithophyre cavity porosity. Ensure Version 1.6 and V1.4 yield results within the acceptance criteria.	Single-phase gas flow at 25°C and pressure at near atmospheric pressure.	Match results of V1.4 (within 0.1% relative error in primary variables).	1-D, linear	Test Problem#4a and Problem#4b
5 Pass C.H. 01/14/02	Verification of proper implementation of effects of temperature-dependent rock specific heat. Ensure Version 1.6 and V1.4 yield results within the acceptance criteria.	(a) 1-D vertical flow in unsaturated zone (b) Two-phase fluid and heat flow (c) Fractured porous media	Match results of V1.4 for a special case of using temperature-independent rock specific heat (within 0.1%).	1-D, linear, vertical	Test Problem#5a and Problem#5b
6 Pass C.H. 01/14/02	Verification of equivalence of TOUGH2 EOS4 V1.6 to V1.4 for the equivalent input data file. Ensure Version 1.6 and V1.4 yield results within the acceptance criteria.	(a) 1-D vertical flow in unsaturated zone (b) Two-phase fluid and heat flow (c) Fractured porous media	Match results of V1.4 for an equivalent case of an EOS4 simulation (within 1%).	1-D, linear, vertical	Test Problem#6a and Problem#6b
7 Pass C.H. 01/14/02	Verification of proper implementation of the scheme of handling spatially varying parameters. Ensure Version 1.6 EOS3 and V1.4 EOS3 yield results within the acceptance criteria.	(a) 1-D vertical flow in unsaturated zone (b) Two-phase fluid and heat flow (c) Fractured porous media using a dual-permeability modeling approach	Match results of V1.4 for an equivalent case of an EOS3 simulation (within 0.1%)	1-D, linear, vertical	Test Problem#7a and Problem#7b

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8 Pass C.H. 01/14/02	Verification of proper implementation of the scheme of handling spatially varying permeability and "DRAIN" boundary condition. Ensure Version 1.6 EOS9 and V1.4 EOS9 yield results within the acceptance criteria.	(a) 1-D vertical flow in unsaturated zone (b) Liquid flow in two-phase condition (c) Fractured porous media using a dual-permeability modeling approach	Match results of V1.4 for an equivalent case of an EOS9 simulation (within 0.1%).	1-D, linear, vertical	Test Problem#8a and Problem#8b
9 Pass C.H. 01/14/02	Verification of proper implementation of the scheme of handling "DRAIN" boundary condition. Ensure Version 1.6 and V1.4 yield results within the acceptance criteria.	(a) 1-D vertical flow in unsaturated zone (b) Two-phase fluid flow (c) Fractured porous media using a dual-permeability modeling approach	Match results of V1.4 for an equivalent case of an EOS3 simulation (within 0.1%).	1-D, linear, vertical	Test Problem#9a and Problem#9b
10 Pass C.H. 01/14/02	Verification of proper implementation of the scheme of fracture-fracture vapor diffusion modification by fracture porosity. Ensure Version 1.6 and V1.4 yield results within the acceptance criteria.	(a) 1-D vertical flow in unsaturated zone (b) Single-phase gas flow (c) Fractured porous media using a dual-permeability modeling approach	Match results of V1.4 for an equivalent case of an EOS3 simulation (within 0.1%).	1-D, linear, vertical	Test Problem#10a and Problem#10b
11 Pass C.H. 01/14/02	Verification of proper implementation of the scheme of performing a joint execution with FLAC3D V2.0, a rock mechanics code for thermal-hydrologic-mechanic (THM) coupling simulation. Ensure Version 1.6 and V1.4 yield results within the acceptance criteria, with no change in fracture aperture.	(a) 1-D vertical flow in unsaturated zone (b) Single-phase gas flow (c) Fractured porous media using a dual-permeability modeling approach	Match results of V1.4 for an equivalent case of an EOS3 simulation (within 0.1%).	1-D, linear, vertical without changes in apertures of fractures	Test Problem#11a and Problem#11b

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12 Pass C.H. 01/14/02	Verification of proper implementation of the scheme of performing a joint execution with FLAC3D V2.0, a rock mechanics code for thermal-hydrologic-mechanic (THM) coupling simulation. Ensure Version 1.6 and V1.4 yield results within the acceptance criteria, with finite change in fracture apertures.	(a) 1-D vertical flow in unsaturated zone (b) Single-phase gas flow (c) Fractured porous media using a dual-permeability modeling approach	Match results of V1.4 for an equivalent case of an EOS3 simulation (within 0.1%).	1-D, linear, vertical with changes in apertures of fractures	Test Problem#12a and Problem#12b

is unique software validation test problem number

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VALIDATION TEST PLAN (VTP)
for
WinGridder V 2.0

LBNL-2001-231
SAN: ~~LBNL 2001-131~~ (P) 03/11/2002
Document Identifier: 10024-VTP-2.0-00
STN: 10024-2.0-00
SMN: 10024-MED-2.0-00

Prepared by: Lehua Pan Date 2/7/02
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DPS 04/04/02 Reviewed by ~~Approved by:~~ Dianne P Spence Date 04/04/02
Dianne Spence
Information Technology
Software Management Analyst (ITSMA)

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CHANGE HISTORY

Revision Number	Effective Date	Description of Change
00-pre-ITSMA review	02/28/02	Initial issue of CP1 documents prior to ITSMA review.

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In accordance with AP-SI.1Q, Rev. 3, ICN 3, *Software Management*, this Validation Test Plan (VTP) is based upon Software Activity Plan (SAP) 10024-SAP-2.0-01, Requirements Document (RD) 10024-RD-2.0-00, Design Documents 10024-DD-2.0-00, and Installation Test Plan (ITP) 10024-ITP-2.0-00.

1. DESCRIPTION OF THE TEST CASES

We provide five tests cases to validate the requirements in Requirements Document 10024-RD-2.0-00 and related elements in Design Documents 10024-DD-2.0-00.

- **Test Cases for Validation of Functional Requirements**

WinGridder is developed to design and generate grids for numerical simulators that are based on the "integral finite difference" or the "control volume" numerical scheme. Two new functions are added to WinGridder V2.0 as follows: (1). Geological consistency of the grid representing the hydrogeologic input data, and (2). Consistency of the grid with values from hand calculations. We provide tests cases to validate the new functional requirements.

The description of the problem and type of problem are provided in Table 1. The test cases 1, 2 and 4 are for testing the single-continuum grid generation while the test case 3 is for testing the dual-K grid generation. The test cases 2 and 4 are designed specifically to check the Version 2.0 new features-Using Bilinear Interpolation Method to Calculate the Thickness of a Geological Layer or the Interface Elevation From the Given Digital Geological Model and Handling a Repository with Multiple Sub-Regions and Specified Drifts, respectively. The test case 5 is for installation test.

- **Test Case for Validation of Input and Output Requirements**

The description of the problem and type of problem are provided in Table 1. Test cases 1, 2, 3, and 4 are used to test manual input requirements, automated input requirements, output requirements, input/output options requirements, data file, input and output data formats requirements, allowable ranges of inputs and outputs requirements, anticipated errors and method(s) of handling requirements.

- **Test Case for Validation of Performance Requirements**

Not applicable. In requirements document 10024-RD-2.0-00, the code does not have particular performance requirements, so we do not need to test performance requirements.

- **Test for User Interface Requirements**

Test cases 1, 2, 3, and 4 are used to test user interface requirements. The description of the problem and type of problem are provided in Table 1.

- **Test for System Interface Requirements**

Test cases 1, 2, 3, and 4 are used to test system interface requirements. The description of the problem and type of problem are provided in Table 1.

- **Test for communication Requirements**

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Not applicable. The code does not have particular performance requirements, so we do not need to test communication requirements.

- **Test for Security Access Requirements**

Not applicable. The code does not have particular security access requirements, so we do not need to test security access requirements.

- **Test for Backup and Recovery Requirements**

Not applicable. The code does not have particular backup and recovery requirements, so we do not need to test backup and recovery requirements.

- **Test for Data Requirements**

Test cases 1, 2, 3, and 4 are used to test data requirements. The description of the problem and type of problem are provided in Table 1.

- **Test for Implementation Requirements**

Installation and test cases 1, 2, 3, and 4 are used to test implementation requirements. A user who is familiar with the code's calculations install the software on the target platform (Pentium II or above PC with Windows 98/NT operating system) and run the test cases 1, 2, 3, and 4.

2. ACCEPTANCE/REJECTION CRITERIA

This section provides the acceptance/rejection criteria to be used by the independent validation tester conducting the validation test to determine adequacy of the functions specified in the requirements of the RD as well as the design elements stipulated in the DD for the software.

- **Acceptance/Rejection Criteria for Validation of Functional Requirements**

Table 1 lists the requirements and acceptance criteria that are established to validate the functional requirements of WinGridder V2.0. The qualitative acceptance criterion is that the execution finishes without error. By successfully generating the test grids, the user shall have confidence in meeting the functional requirements.

- **Acceptance/Rejection Criteria for Validation of Input and Output Requirements**

The qualitative acceptance criterion is that the execution of test cases 1, 2, 3, and 4 finishes without error. By successfully generating the test grids, the user shall have confidence in meeting inputs and outputs requirements.

- **Acceptance/Rejection Criteria for User Interface Requirements**

The qualitative acceptance criterion is that the execution of test cases 1, 2, 3, and 4 finishes without error. By successfully generating the test grids, the user shall have confidence in meeting user interface requirements.

- **Acceptance/Rejection Criteria for System Interface Requirements**

The qualitative acceptance criterion is that the execution of test cases 1, 2, 3, and 4 finishes without error. By successfully generating the test grids, the user shall have confidence in meeting user interface requirements.

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- **Acceptance/Rejection Criteria for Data Requirements**

The qualitative acceptance criterion is that the execution of test cases 1, 2, 3, and 4 finishes without error. By successfully generating the test grids, the user shall have confidence in meeting data requirements.

- **Acceptance/Rejection Criteria for Implementation Requirements**

The qualitative acceptance criterion is that the execution of installation and test cases 1, 2, 3, and 4 finishes without error.

3. INSTRUCTIONS FOR RUNNING TEST CASES

3.1 Installation

- **Pre-installation tasks**

Remove WinGridder V1.0 or V1.1 on the user's PC using MS Windows' Add/Remove Program functionality if any before installing WinGridder V2.0.

- **Action necessary to complete the installation procedure**

The program will need Windows 98/NT on a PC with a CD drive to run.
Insert the CD into the CD drive.
Click Start→Run on the Windows and then click Browser button.
Select the \V2.0\Setup.exe on the CD drive.
Follow the instructions on the screen in install the software.

- **Software and data transfer to the target platform**

Create a directory on the user's hard drive (e.g., \Examples).
Copy all the files under the directories called "\Sample2.0\case1\" on the CD into the directory the user just created on his/her hard drive.

- **Tasks to be performed following the software transfer**

Make sure all files transferred to the target platform (the examples) are not read-only. Change the attributes through the Windows operating system if needed. Also make sure to compare the files on the CD with the target location to assure complete transfer.

- **Setting initial operating conditions**

See Section 4.

- **Installation test case**

The test case used to accurately confirm a correct installation and ready-for-use condition is as follows (Be sure that you load and save files under your directory "\Examples\case1"):

Step 1. Run WinGridder V2.0
Load lateral boundary information: File→Load→Bound (from the Menu Bar)
Select file "Sample3D.bnd". This file defines the lateral boundary of the domain.

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From menu bar, select Design 2D
Under "Select an Object," choose DomainBound; Specify an Average Distance (node spacing): 10 (distance in meters) and click Add Nodes. A number of windows pop up. Enter the following information:
"Rectangular mesh?": Yes
"Please enter Angle to PositiveX": enter 0
"Please enter the ratio of size:Y to X": enter 1
Click "Save" and the file is saved as "Sample3D.in"
From the menu bar, select: Generate 2D
Select "Sample3D.in" and click "Open"

Step 2. Load the 2-D grid information: From the menu bar, select File→Load→Grid
Select file "Sample3D.grd" and click "Open".
Click "OK" on the next window.

Step 3. Generate the 3-D grid
From the menu bar, select: Generate→ 3D→Full mesh
A window pops up and asks the user "Do you want to save the project automatically?": select "Yes."
The project is saved as: "Sample3D.prj"
Pop-up windows appear for which the following information is specified:
"No layers! You Should load layer data first!": click "OK".
Select "LayerList" in the Open File window and click "Open".
Select "LayerList.roc" in the Open File window and click "Open".
"Do boreholes have their own layering information?" Select "No".
"Do you want to set different water table in the area west of Sol canyon fault?" Select "No".
"Use long LBNL name (8 characters)?": select "No"
"Please type in the MINIMUM thickness of a cell. A layer that has thickness smaller than this value will be ignored!": enter 1 (meters).
"Please type in the MAXIMUM thickness of a cell. A layer that has thickness larger than this value will be subdivided!": enter 10 (meters).
"Please type in the MAXIMUM thickness of a cell BELOW REPOSITORY. A layer that has thickness larger than this value will be subdivided!": enter 10 (meters).
Click "Default" and then "OK" on the Edit Layer option window.
"Do you want to have a locally dense grid for the Repository?" Select "No".

- **Expected results**

From the menu bar, select File→Save→3D mesh. The mesh file is saved as "Test3D.mesh."

- **Installation acceptance criteria**

Compare the "Test3D.mesh" with the provided file "Sample3D.mesh" to see if they are consistent. If there are no differences, the installation is considered successful.

3.2 Execute Test Case1

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Execute test case1 following the steps described in Appendix A.

3.3 Execute Test Case2

Execute test case2 following the steps described in Appendix A.

3.4 Execute Test Case3

Execute test case3 following the steps described in Appendix A.

3.5 Execute Test Case4

Execute test case4 following the steps described in Appendix A.

4. PROVISIONS FOR INDICATING TEST STATUS

Table 1 shall be used to record the status and results of the test. In the table, the independent tester shall use the margin next to each test case number to record results that includes pass/fail annotation with initial of the tester and date of the testing.

5. ALTERNATIVE VALIDATION METHOD

Not applicable as the validation tests defined in Table 1 are sufficient to ensure that the software product adequately and correctly performs all intended functions and does not perform any unintended functions either by itself or in combination with other functions.

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Table 1. Validation Test Cases

Case	Requirement	Problem Type	Acceptance Criteria
1 Pass L.J.H. 01/24 /02	Verification of consistency between WinGridder generated grid and hand calculated values. Verification of input/output, user interface, system interface, data, and implementation requirements met.	Compare 3-D grid to hand calculated values for volumes, surface areas, connection distances and connection angles.	Grid-generated values to be within 1% of hand calculated values
2 Pass L.J.H. 01/24 /02	Verification of consistency between WinGridder-generated grid and hydrogeologic model. Verification of input/output, user interface, system interface, data, and implementation requirements met.	Compare a grid to YMP Geologic Framework Model, Versions 3.1 (GFM3.1) for the unsaturated zone (in terms of the elevations and thickness of a selected layer)	Qualitative and quantitative (within 1 m) matching to hydrogeologic input data model
3 Pass L.J.H. 01/25 /02	Verification of consistency between WinGridder-generated dual-permeability grid and hand calculated values. Verification of input/output, user interface, system interface, data, and implementation requirements met.	Compare 3-D dual-permeability grid to hand calculated values for volumes, surface areas, connection distances and node coordinates.	Grid-generated values to be within 1% of hand calculated values
4 Pass L.J.H. 01/25 /02	Verification of accuracy of WinGridder-generated grid representative of the repository. Verification of input/output, user interface, system interface, data, and implementation requirements met.	Compare repository grid cells to the drift that they are representing (in terms of the elevation) elevation of the repository.	Grid-generated values to be within 1% of hand calculated values

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APPENDIX A STEPS FOR EXECUTION OF THE TEST CASES (GENERATION OF THE GRID)

1. Case 1: A simple 3-D grid

1.1 Development of the grid

1. Load lateral boundary information: File→Load→ Bound

Select file "Sample3D.bnd". This file defines the lateral boundary of the domain.
From menu bar, select Design 2D
Under "Select an Object," choose DomainBound; Specify an Average Distance (node spacing): 10 (distance in meters) and click Add Nodes. A number of windows pop up. Enter the following information:
"Rectangular mesh?": Yes
"Please enter Angle to PositiveX": enter 0
"Please enter the ratio of size:Y to X": enter 1
Click "Save" and the file is saved as "Sample3D.in"
From the menu bar, select: Generate 2D
Select "Sample3D.in" and click "Open"

2. Load the 2-D grid information: From the menu bar, select File→Load→Grid

Select file "Sample3D.grd" and click "Open".
Click "OK" on the next window.

3. Generate the 3-D grid

From the menu bar, select: Generate→ 3D→Full mesh
A window pops up and asks the user "Do you want to save the project automatically?": select "Yes."
The project is saved as: "Sample3D.prj"
Pop-up windows appear for which the following information is specified:
"No layers! You Should load layer data first!": click "OK".
Select "LayerList" in the Open File window and click "Open".
Select "LayerList.roc" in the Open File window and click "Open".
"Do boreholes have their own layering information?" Select "No".
"Do you want to set different water table in the area west of Sol canyon fault?" Select "No".
"Use long LBNL name (8 characters)?": select "No"
"Please type in the MINIMUM thickness of a cell. A layer that has thickness smaller than this value will be ignored!": enter 1 (meters).
"Please type in the MAXIMUM thickness of a cell. A layer that has thickness larger than this value will be subdivided!": enter 10 (meters).
"Please type in the MAXIMUM thickness of a cell BELOW REPOSITORY. A layer that has thickness larger than this value will be subdivided!": enter 10 (meters).
Click "Default" and then "OK" on the Edit Layer option window.
"Do you want to have a locally dense grid for the Repository?" Select "No".

1.2 Output

From the menu bar, select File→Save→3D mesh. The mesh file is saved as "Sample3D.mesh."

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1.3 Validation of the Grid

Comparing the WinGridder output to the hand-calculated values will be performed to check consistency between the generated 3-D grid and the theoretical geometry data of the grid.

2. Case 2: Consistency between WinGridder-generated grid and hydrogeologic model

2.1. 2D Grid (column scheme) Development

Relevant files for plan-view CrossAt235087 grid generation include:

File Name	*Description*
CrossAt235087.bnd	Domain boundary coordinates
DumyAt235087.dft	Dummy drift coordinates
FLTsolcan.fut	Solitario Canyon Fault coordinates
FLTpagany.fut	Pagany Wash Fault coordinates
FLTdrill.fut	Drill Hole Wash Fault coordinates

The following steps were taken to produce the plan-view CrossAt235087 grid:

Step 1: Load lateral boundary information: File → Load → Bound
Select files "CrossAt235087.bnd" These files define the domain.

Step 2: Load fault information: File → Load → Faults
Select the above three faults (FLTsolcan.fut, FLTpanany.fut, and FLTdrill.fut).

Step 3: Load the dummy drift information: File → Load → Drifts
Select files "DumyAt235087.dft"

Step 4: From the menu bar, select: Design → 2D
Under "Select an Object," choose Domainbound.
Enter an "Average Distance" (node spacing) of 100 (meters).
Pop-up windows appear:
Rectangular Mesh? No
Random? Yes
Under "Select an Object," choose DumyDriftCrossSection.
Enter an "Average Distance" of 10 (meters).
Click Add Nodes.
FLTdrill.d:The thickness of the fault: enter 10 (meters).
FLTdrill.d:The minimum displacement beyond which the fault considered as inclined: enter 1,000,000 (meters).
FLTpagany.:The thickness of the fault: enter 10 (meters).
FLTpagany.d:The minimum displacement beyond which the fault considered as inclined: enter 1,000,000 (meters).
FLTsolcan.:The thickness of the fault: enter 10 (meters).
FLTsolcan.:The minimum displacement beyond which the fault considered as inclined: enter 1,000,000 (meters).

Step 5: At this point, the side nodes next to the fault nodes are modified (e.g., edit the KIND properties of those nodes to "XXXXSide#"; "XXXX" is the ID of the related fault node and # is either 0 or 1) to achieve a desired nodal point array. The nodal array is saved as: "CrossAt235087.in"

Step 6: From the menu bar, select: Generate → 2D

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Load the file "CrossAt235087.in." The program runs and creates the file "CrossAt235087.grd."

Step 7: Load the grid file "CrossAt235087.grd".

Step 8: Save the 2-D grid: Project→ Save → 2D
The project is saved as "CrossAt235087_2D.prj"

2.2. 3D Grid Development

Relevant files for 3-D CrossAt235087 grid generation include:

File Name	*Description*
CrossAt235087_2D.prj	the plan-view grid project
CrossAt235087.bnd	the domain boundary
LayerList.txt	list of all elevation & thickness files needed for the 3-D grid
Layerorder.dat	compilation of all header information contained in the LayerList files
UZ99.roc	assigns a rock material type to each layer file
*.dat	all binary files of individual layers

Step 1: Open WinGridder2.0, Load lateral boundary information: Select files "CrossAt235087.bnd" and then load the 2-D grid project: "CrossAt235087_2D.prj". Click "OK" on the window of "This is a 2-D project!"

Step 2: From the menu bar, select: Generate → 3D → Cells/Vertical Cons Only
A window pops up and asks "Do you want to save the project automatically?" select "Yes." Then enter "CrossAt235087_3D.prj" in the Saving Projectfile window and click "Save".

Pop-up windows appear for which the following information is specified:
"Use long LBNL name (8)?" select "Yes".
"No layers! You Should load layer data first!": click "OK".
Select "LayerList" in the Open File window and click "Open".
Select "UZ99.roc" in the Open File window and click "Open".
"Do boreholes have their own layering information?" Select "No".
"Do you want to set different water table in the area west of Sol canyon fault?" Select "Yes".
"Please type in the difference (West-East)": enter 46 (meters) and click "OK".
Select "FLTsolcan.fut" in the Open file window and then click "Open".
"Please type in the MINIMUM thickness of a cell. A layer that has thickness smaller than this value will be ignored!": enter 0.01 (meters).
"Please type in the MAXIMUM thickness of a cell. A layer that has thickness larger than this value will be subdivided!": enter 20 (meters).
"Please type in the MAXIMUM thickness of a cell BELOW REPOSITORY. A layer that has thickness larger than this value will be subdivided!": enter 20 (meters).
Click "Default" and then "OK" on the Edit Layer option window.
"Do you want to have a locally dense grid for the Repository?" Select "No". WinGridder will create 3-D cells and vertical connections.

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Step 3: From the menu bar select: Generate → 3D → Lateral Cons Only
Response to pop-up windows as following:
"Please type in the MINIMUM thickness of a cell. A layer that has thickness smaller than this value will be ignored!": enter 0.01 (meters).
The program runs and saves the 3-D grid as: "CrossAt235087_3D.prj"

2.3. Outputs

From the menu bar, select File→Save→3D mesh. The output TOUGH2 file created is called: "CrossAt235087.mesh"

2.4 Validation of the Grid

(1) Extract x, y, z, and thickness data of all cells that belong to a selected geologic layer.
(2) Calculate the top or bottom elevation and the thickness of the layer for each pair of (x, y) as the WinGridder v2.0 interpolated values.
(3) Compare the elevation and thickness data to the data extracted from GFM3.1 for the same (x, y) locations.
If the criteria are meet, the generated grid consistently represents the geological model and the interpolation functionality implemented in WinGridder v2.0 works well and is valid.

3. Case 3: A dual-permeability grid

3.1 Development of a dual-permeability grid

The involved files are

Input files:	
'framtr.fp'	the fracture property file
'2kgrid.m2k'	the single-continuum gird file (cells and connections)
'2kgrid.idx'	the single continuum file (connection indexes)
Output files:	
'2kgrid.2ko'	the output file for cross-reference of the cell names in two meshes
'2kgrid.2ke'	the Dual-K mesh file (cells)
'2kgrid.2kc'	the Dual-K mesh file (connections)

Steps:

Open WinGridder2.0, Load lateral boundary information: Select files "Sample3D.bnd".
Select Project →Open to load the 3-D grid project: "Sample3D.prj".

Select Generate →3D→Dual-K Mesh, the WinGridder will ask you to select a fracture property file which you should select "FRAMTR.fp";
Click Yes for question "Has ECM mesh been saved for 2K grid?" box, then select the file "2KGRID.m2k" in file selection box, and the WinGridder will automatically load "2kgrid.idx" after loading "2krid.m2k".
The output files "2kgrid.2ke" and "2kgrid.2kc" contain the cells and the connections, respectively, in the format readable by TOUGH family codes.

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3.2 Validation of the dual-permeability grid

The generated grid will be compared with the hand-calculated values.

4. Case 4: Consistency between WinGridder-generated grid and the repository geometry

4.1. 2D Grid (column scheme) Development

Relevant files for plan-view Grid2001 grid generation include:

File Name	*Description*
Domain2001.bnd	Domain boundary coordinates
Repo2001.bnd	repository information
FLTsolitario.dat.fut	Solitario Canyon Fault coordinates
FLTpagany.dat.fut	Pagany Wash Fault coordinates
FLTdrill.dat.fut	Drill Hole Wash Fault coordinates
FLTghost.dat.fut	Ghost Dance Fault coordinates

The following steps were taken to produce the plan-view Grid2001 grid:

Step 1: Load lateral boundary information: File → Load → Bound
Select files "Domain2001.bnd" and "repo2001.bnd".

Step 2: Load fault information: File → Load → Faults
Select the above three faults (FLTsolcan.dat.fut, FLTpanany.dat.fut, FLTghost.dat.fut and FLTdrill.dat.fut).

Step 3: From the menu bar, select: Design → 2D
Under "Select an Object," choose "Domainbound".
Enter an "Average Distance" (node spacing) of 300 (meters).
Pop-up windows appear:
"Rectangular Mesh?": Yes
"Please enter Angle to PositiveX": 0
"Please enter the ratio of size:Y to X": 1
Under "Select an Object," choose "Repository".
Enter an "Average Distance" of 271 (meters).
Click Add Nodes.
Under "Select an Object," choose "All Faults".
Enter an "Average Distance" of 100 (meters).
Edit "MinDis", "Width", and "avgDis" for each fault as below:

Fault	MinDis	Width	avgDis
FLTdrill.dat.f	500	30	200
FLTghost.da	500	30	100
FLTpagany.	500	30	200
FLTsolitario.	1	30	100

Click "OK" on the "Set Fault Option" window after editing.

Step 4: At this point, some nodes are added, deleted or modified interactively to achieve a desired nodal point array. The nodal array is saved as: "Grid2001.in"

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Step 5: From the menu bar, select: Generate → 2D
Load the file "Grid2001.in." The program runs and creates the file "Grid2001.grd."

Step 6: From the menu bar, select: File → Load→ Grid and then select "Grid2001.grd". Click "OK" on the pop-up information box.

Step 7: From the menu bar, select: Design → Remove bad Segments.
"Please input the MINIMUN RATIO of a segment to a cell. (5%)": Enter 5. Click "OK".
Click "OK" on the pop-up information box.

Step 8: Save the 2-D grid: Project→ Save → 2D
The project is saved as "Grid2001_2D.prj"

4.2. 3D Grid Development

Relevant files for 3-D Grid2001 grid generation include:

File Name	*Description*
Grid2001_2D.prj	the plan-view grid project
Grid2001.bnd	the domain boundary
Repo2001.bnd	the repository information
LayerList.txt	list of all elevation & thickness files needed for the 3-D grid
Layerorder.dat	compilation of all header information contained in the LayerList files
UZ99.roc	assigns a rock material type to each layer file
*.dat	all binary files of individual layers

Step 1: Open WinGridder2.0, Load lateral boundary information: Select files "Grid2001.bnd" and then load the 2-D grid project: "Grid2001_2D.prj". Click "OK" on the window of "This is a 2-D project!"

Step 2: From the menu bar, select: Edit→ Update Repo Columns.

Step 3: From the menu bar, select: Generate → 3D → Cells/Vertical Cons Only
A window pops up and asks "Do you want to save the project automatically?" select "Yes."
Then enter "Grid2001_3D.prj" in the Saving Projectfile window and click "Save".

Pop-up windows appear for which the following information is specified:
"Use long LBNL name (8)?" select "Yes".
"No layers! You Should load layer data first!": click "OK".
Select "LayerList" in the Open File window and click "Open".
Select "Layer2001.roc" in the Open File window and click "Open".
"Do boreholes have their own layering information?" Select "No".
"Do you want to set different water table in the area west of Sol canyon fault?" Select "No".
"Please type in the MINIMUM thickness of a cell. A layer that has thickness smaller than this value will be ignored!": enter 1.5 (meters).

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"Please type in the MAXIMUM thickness of a cell. A layer that has thickness larger than this value will be subdivided!": enter 60 (meters).
"Please type in the MAXIMUM thickness of a cell BELOW REPOSITORY. A layer that has thickness larger than this value will be subdivided!": enter 20 (meters).
Click "Default" and then "OK" on the Edit Layer option window.
"Do you want to have a locally dense grid for the Repository?" Select "No". WinGridder will create 3-D cells and vertical connections.

Step 4: From the menu bar select: Generate → 3D → Lateral Cons Only
Response to pop-up windows as following:
"Please type in the MINIMUM thickness of a cell. A layer that has thickness smaller than this value will be ignored!": enter 1.5 (meters).
The program runs and saves the 3-D grid as: "Grid2001_3D.prj" automatically.

4.3. Outputs

From the menu bar, select File→Save→3D mesh. The output TOUGH2 file created is called: "Grid2001.mesh"

4.4 Validation of the Grid

(1) Extract x, y, z data of typical repository cells from the grid.
(2) Compare these data with the corresponding elevation data of the repository drifts in the repository input data file (i.e., repo2001.bnd).
If the criteria are meet, the WinGridder V2.0 is proved to be able handle a multiple-region repository correctly.

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SOFTWARE BASELINE REQUEST

QA: QA
Page: 2 of:

Complete Only Applicable Items

1. Software Tracking Number:	2. Software Name and Version:	3. Software Activity Number:
10207-2.1-00	SZ_CONVOLUTE v2.1	LANL-2001-136

11. ☑ **SECTION III - Control Point 1, Planning and Requirements and Design Phase Baselining**

12. ☐ **SECTION IV - Control Point 2, Implementation and Validation Phase Baselining**

☑ Add to Baseline ☐ Change to Baseline ☐ Superseded by Previous Version
☐ Retire from Baseline ☐ Canceled from Baseline ☐ Remove from Baseline

13. Description of Baseline Activity:
SZ_CONVOLUTE Version 2.1 is a modification to SZ_CONVOLUTE Version 2.0 used in the TSPA. This new modification is necessary so that the code can properly handle the mass flux output immediately after a climate change.
SZ_CONVOLUTE Version 2.1 calculates mass flux instead of concentration as in Version 2.0 at the SZ outflow boundary based on the saturated zone generic response curves and unsaturated zone radionuclide source terms for the Yucca Mountain Project.
The theoretical basis of SZ_CONVOLUTE is convolution. Produce documentation and manuals required to comply with OCRWM AP-SI.1Q, Rev 3, ICN 3, Software Management.

14. Rationale for Baseline Activity:
SZ_CONVOLUTE Version 2.1 is a modification to SZ_CONVOLUTE Version 2.0 used in the TSPA. This new modification is necessary so that the code can properly handle the mass flux output immediately after a climate change. SZ_CONVOLUTE Version 2.1 calculates mass flux instead of concentration as in Version 2.0 at the SZ outflow boundary based on the saturated zone generic response curves and unsaturated zone radionuclide source terms for the Yucca Mountain Project. The theoretical basis of SZ_CONVOLUTE is convolution.

15. Request for Following Documents be Controlled:
10207-SAP-2.1-00, Software Activity Plan
10207-VTP-2.1-00, Validation Test Plan

16. Remarks (Such as known copyright and license issues, abstract, etc.):
SZ_CONVOLUTE Version 2.1 calculates mass flux instead of concentration as in Version 2.0 at the SZ outflow boundary based on the saturated zone generic response curves and unsaturated zone radionuclide source terms for the Yucca Mountain Project. The theoretical basis of SZ_CONVOLUTE is convolution. There are no copyright or licensing issues.

17. Responsible Manager Name and Organization:	Responsible Manager Signature:	Date:
Bruce Robinson, EES-6, LANL		21 December 2001
18. ITSMA Representative Name:	ITSMA Representative Signature:	Date:
Lyle Southworth		
19. SCM Representative Name:	SCM Representative Signature:	Date:
Jeffery Mason		
20. Software Management Manager Name:	Software Management Manager Signature:	Date:

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Addendum 1

and a total of 26 machines. The property tag number for those machines are listed below.

Rack 1:

Pinyon	114333
Juniper	114332
Cottonwood	114335
Aspen	114334
Mesquite	114331
Willow	114329
Sage	114328
Joshua	114330

Rack 2:

Cholla	117169
Hedgehog	117172
Lechuguilla	117171
Mescal	117170
Ocotillo	117168
Organpipe	117173
Pricklypear	117165
Yucca	117167

Rack 3:

Bighorn	117885
Coyote	117886
Antelope	117880
Cougar	117887
Chuckwalla	117882
Wapiti	117879
Bobcat	117881
Roadrunner	117884
Ellobo	117883
Saguaro	117166

SZ_Convolute Version 2.1 shall require only the Software Activity Plan (SAP), Validation Test Plan (VTP) and Validation Test Report (VTR) to be developed for this version. Due to the minor update for Version 2.1; this version will use the Requirements Document (RD), Design Document (DD), Installation Test Plan (ITP) and Users Manual (UM) from Version 2.0.

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SOFTWARE BASELINE REQUEST

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Page: 1 of:

Complete Only Applicable Items

1. Software Tracking Number:	2. Software Name and Version:	3. Software Activity Number:
10207-2.1-00	SZ_CONVOLUTE v2.1	LANL-2001-136

SECTION I - Software Activity Designation (Description of software project [users of software, user location, CPU and platform identification])

4.
SZ_CONVOLUTE Version 2.1 is a modification to SZ_CONVOLUTE Version 2.0 used in the TSPA. This new modification is necessary so that the code can properly handle the mass flux output immediately after a climate change. SZ_CONVOLUTE Version 2.1 calculates mass flux instead of concentration as in Version 2.0 at the SZ outflow boundary based on the saturated zone generic response curves and unsaturated zone radionuclide source terms for the Yucca Mountain Project. The theoretical basis of SZ_CONVOLUTE is convolution. SZ_CONVOLUTE Version 2.1 is used by M&O PA operations in Las Vegas, Nevada. The software will run under the Windows NT operating system on a PC platform. Primary users of the software are David Sevougian, Donald Kalinich, and Sunil Mehta in Las Vegas, NV. The code is run in a distributed system consists of 3 racks. (See Addendum 1)

SECTION II - Software Identification (Supplier/Source Name, Address, and Point of Contact and Telephone number [if available])

5. Source:

- ☐ Acquired
- ☑ Developed or Modified

6. Media Number: _____

Media Type:

- ☐ Tape - Specify _____
- ☐ Disk - Specify _____
- ☑ CD ROM
- ☐ Other _____

Software Baseline Documentation Numbers:

7. Title and Version Number:

Title and Version Number	Software Grading Classification	Number: ☑ 1	☐ 2	☐ 3
SZ_CONVOLUTE v2.1	☐ SMR or ☑ SAP	10207-SAP-2.1-00		
SZ_CONVOLUTE v2.0	☐ SDR or ☑ RD	10207-RD-2.0-00		
SZ_CONVOLUTE v2.0	DD	10207-DD-2.0-00		
SZ_CONVOLUTE v2.0	ITP	10207-ITP-2.0-00		
SZ_CONVOLUTE v2.1	VTP	10207-VTP-2.1-00		
SZ_CONVOLUTE v2.0	☐ SIR or ☑ UM	10207-UM-2.0-00		
SZ_CONVOLUTE v2.1	VTR	10207-VTR-2.1-00		

8. Responsible Manager Name:	Responsible Manager Organization:	Date:
Bruce Robinson	EES-6, LANL	29 June 2001

9. Software Configuration Management (SCM) Name:	Date:
Jeffery Mason	

10. ITSMA Representative Name:	Date:

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SOFTWARE BASELINE REQUEST

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QA: QA
Page: 2 of:

Complete Only Applicable Items

1. Software Tracking Number:	2. Software Name and Version:	3. Software Activity Number:
10207-2.1-00	SZ_CONVOLUTE v2.1	LANL-2001-136

11. ☐ **SECTION III - Control Point 1, Planning and Requirements and Design Phase Baselining**

12. ☑ **SECTION IV - Control Point 2, Implementation and Validation Phase Baselining**

☑ Add to Baseline ☐ Change to Baseline ☐ Superseded by Previous Version
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SZ_CONVOLUTE Version 2.1 is a modification to SZ_CONVOLUTE Version 2.0 used in the TSPA. This new modification is necessary so that the code can properly handle the mass flux output immediately after a climate change.
SZ_CONVOLUTE Version 2.1 calculates mass flux instead of concentration as in Version 2.0 at the SZ outflow boundary based on the saturated zone generic response curves and unsaturated zone radionuclide source terms for the Yucca Mountain Project.
The theoretical basis of SZ_CONVOLUTE is convolution. Produce documentation and manuals required to comply with OCRWM AP-SI.1Q, Rev 3, ICN 3, Software Management.

14. Rationale for Baseline Activity:
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15. Request for Following Documents be Controlled:
10207-VTR-2.1-00, Validation Test Report

16. Remarks (Such as known copyright and license issues, abstract, etc.):
SZ_CONVOLUTE Version 2.1 calculates mass flux instead of concentration as in Version 2.0 at the SZ outflow boundary based on the saturated zone generic response curves and unsaturated zone radionuclide source terms for the Yucca Mountain Project. The theoretical basis of SZ_CONVOLUTE is convolution. There are no copyright or licensing issues.

17. Responsible Manager Name and Organization:	Responsible Manager Signature:	Date:
Bruce Robinson, EES-6, LANL		18 March 2002
18. ITSMA Representative Name:	ITSMA Representative Signature:	Date:
Lyle Southworth		
19. SCM Representative Name:	SCM Representative Signature:	Date:
Jeffery Mason		
20. Software Management Manager Name:	Software Management Manager Signature:	Date:

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OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
SOFTWARE BASELINE REQUEST

QA: QA
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Complete Only Applicable Items

1. Software Tracking Number:	2. Software Name and Version:	3. Software Activity Number:
10207-2.1-00	SZ_Convolute v2.1	LANL-2001-136

SECTION V - Software Baselining and Release for Use

21. Remarks:

22. Disposition:

- ☐ Approved
- ☐ Rejected
- ☐ Canceled
- ☐ Removed
- ☐ Retired
- ☐ Disapproved
- ☐ Change to Baseline
- ☐ Superseded by Previous Version
- ☐ Removed for Use by Software Defect Notification
- ☐ Software Defect Notification Resolved/Approved for Use

23. SCM Status Accounting Name:	SCM Status Accounting Signature:	Date:
24. SQA Software Verification Name:	SQA Software Verification Signature:	Date:
25. SCM Baseline Elements Processed Date:		
26. Software Management Manager Name:	Software Management Manager Signature:	Date:

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Addendum 1

and a total of 26 machines. The property tag number for those machines are listed below.

Rack 1:

Pinyon	114333
Juniper	114332
Cottonwood	114335
Aspen	114334
Mesquite	114331
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Sage	114328
Joshua	114330

Rack 2:

Cholla	117169
Hedgehog	117172
Lechuguilla	117171
Mescal	117170
Ocotillo	117168
Organpipe	117173
Pricklypear	117165
Yucca	117167

Rack 3:

Bighorn	117885
Coyote	117886
Antelope	117880
Cougar	117887
Chuckwalla	117882
Wapiti	117879
Bobcat	117881
Roadrunner	117884
Ellobo	117883
Saguaro	117166

SZ_Convolute Version 2.1 shall require only the Software Activity Plan (SAP), Validation Test Plan (VTP) and Validation Test Report (VTR) to be developed for this version. Due to the minor update for Version 2.1; this version will use the Requirements Document (RD), Design Document (DD), Installation Test Plan (ITP) and Users Manual (UM) from Version 2.0.

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SOFTWARE BASELINE REQUEST

QA: QA
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Complete Only Applicable Items

1. Software Tracking Number:	2. Software Name and Version:	3. Software Activity Number:
10207-2.1-00	SZ_CONVOLUTE v2.1	LANL-2001-136

SECTION I - Software Activity Designation (Description of software project [users of software, user location, CPU and platform identification])

4.
SZ_CONVOLUTE Version 2.1 is a modification to SZ_CONVOLUTE Version 2.0 used in the TSPA. This new modification is necessary so that the code can properly handle the mass flux output immediately after a climate change. SZ_CONVOLUTE Version 2.1 calculates mass flux instead of concentration as in Version 2.0 at the SZ outflow boundary based on the saturated zone generic response curves and unsaturated zone radionuclide source terms for the Yucca Mountain Project. The theoretical basis of SZ_CONVOLUTE is convolution. SZ_CONVOLUTE Version 2.1 is used by M&O PA operations in Las Vegas, Nevada. The software will run under the Windows NT operating system on a PC platform. Primary users of the software are David Sevougian, Donald Kalinich, and Sunil Mehta in Las Vegas, NV. The code is run in a distributed system consists of 3 racks. (See Addendum 1)

SECTION II - Software Identification (Supplier/Source Name, Address, and Point of Contact and Telephone number [if available])

5. Source:

- [ ] Acquired
- [x] Developed or Modified

6. Media Number: 10207-PC-2.1-00

Media Type:

- [ ] Tape - Specify _____
- [x] CD ROM
- [ ] Disk - Specify _____
- [ ] Other _____

Software Baseline Documentation Numbers:

7. Title and Version Number:

	Software Grading Classification	Number: [x] 1 [ ] 2 [ ] 3
SZ_CONVOLUTE v2.1	[ ] SMR or [x] SAP	10207-SAP-2.1-00
SZ_CONVOLUTE v2.0	[ ] SDR or [x] RD	10207-RD-2.0-00
SZ_CONVOLUTE v2.0	DD	10207-DD-2.0-00
SZ_CONVOLUTE v2.0	ITP	10207-ITP-2.0-00
SZ_CONVOLUTE v2.1	VTP	10207-VTP-2.1-00
SZ_CONVOLUTE v2.0	[ ] SIR or [x] UM	10207-UM-2.0-00
SZ_CONVOLUTE v2.1	VTR	10207-VTR-2.1-00

8. Responsible Manager Name:	Responsible Manager Organization:	Date:
Bruce Robinson	EES-6, LANL	29 June 2001

9. Software Configuration Management (SCM) Name:	Date:
Jeffery Mason	

10. ITSMA Representative Name:	Date:

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QA:QA

SZ_Convolute Version 2.1
10207-PC-2.1-00
Control Points 1 and 2
robinson@lanl.gov
Bruce Robinson, EES-6

SAN: LANL-2001-136
Documents and Code
Los Alamos National Laboratory
17 April 2002

Los Alamos
NATIONAL LABORATORY

ORIGINAL
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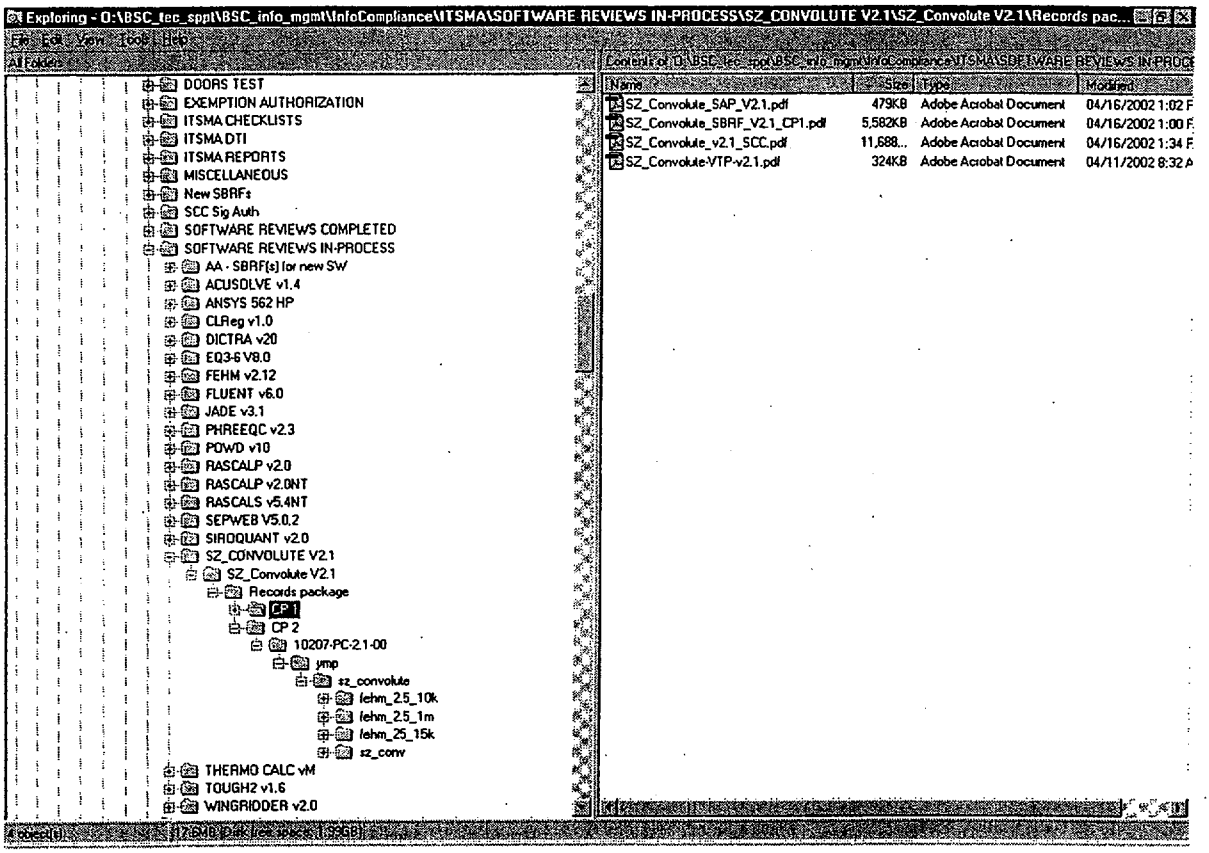

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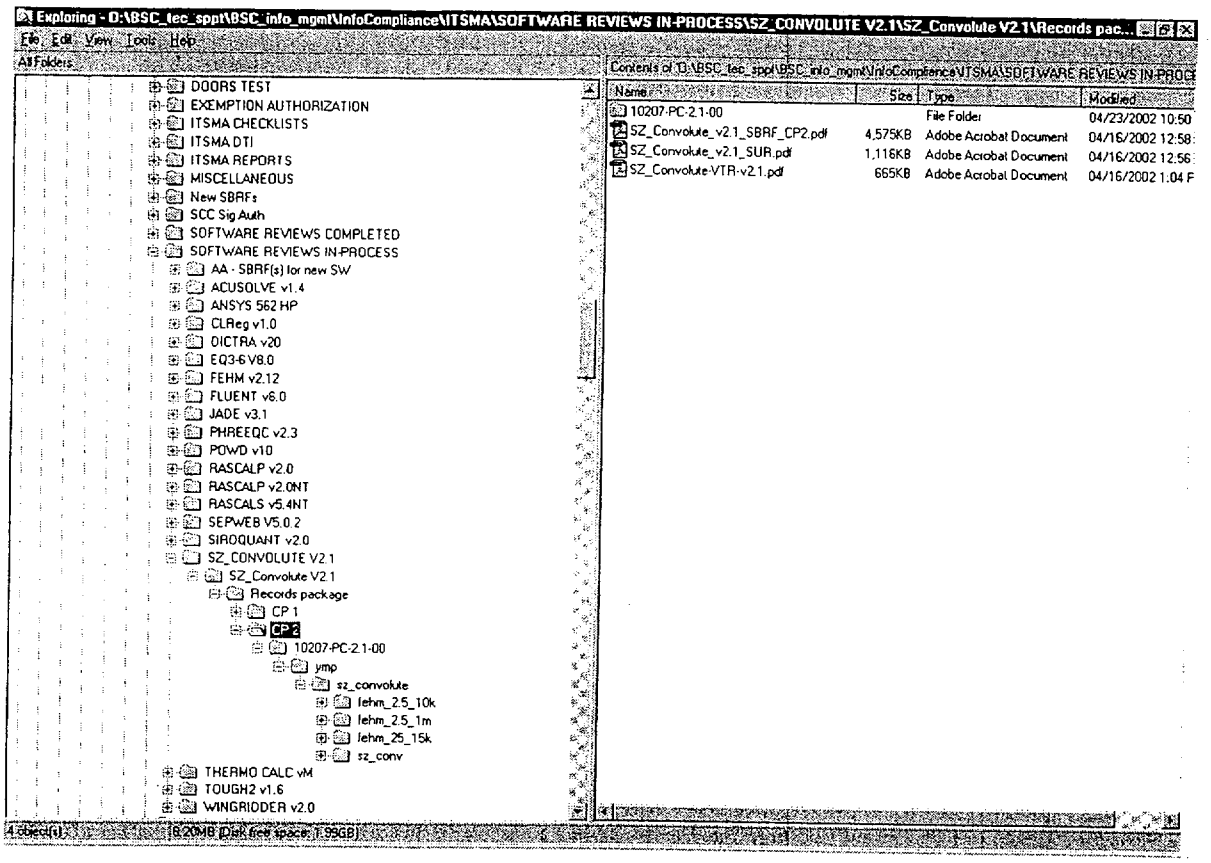

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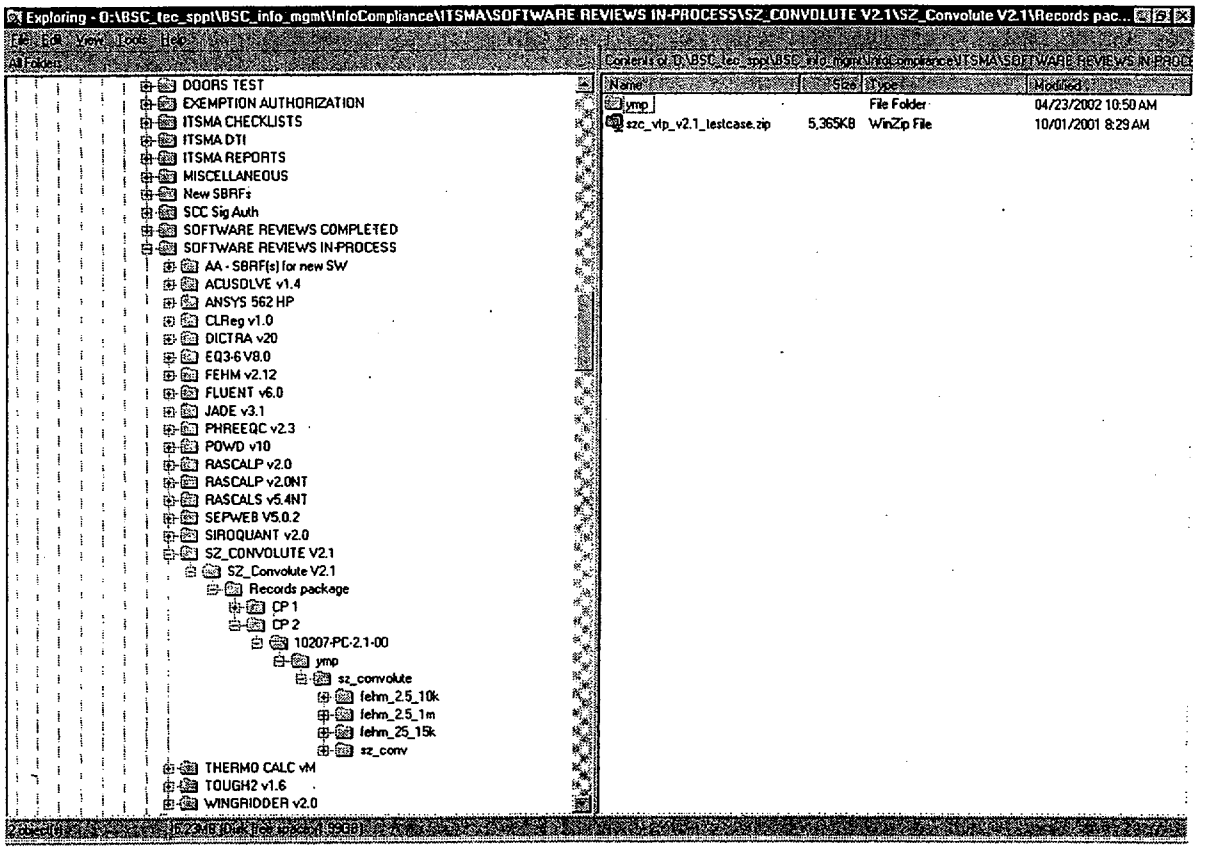

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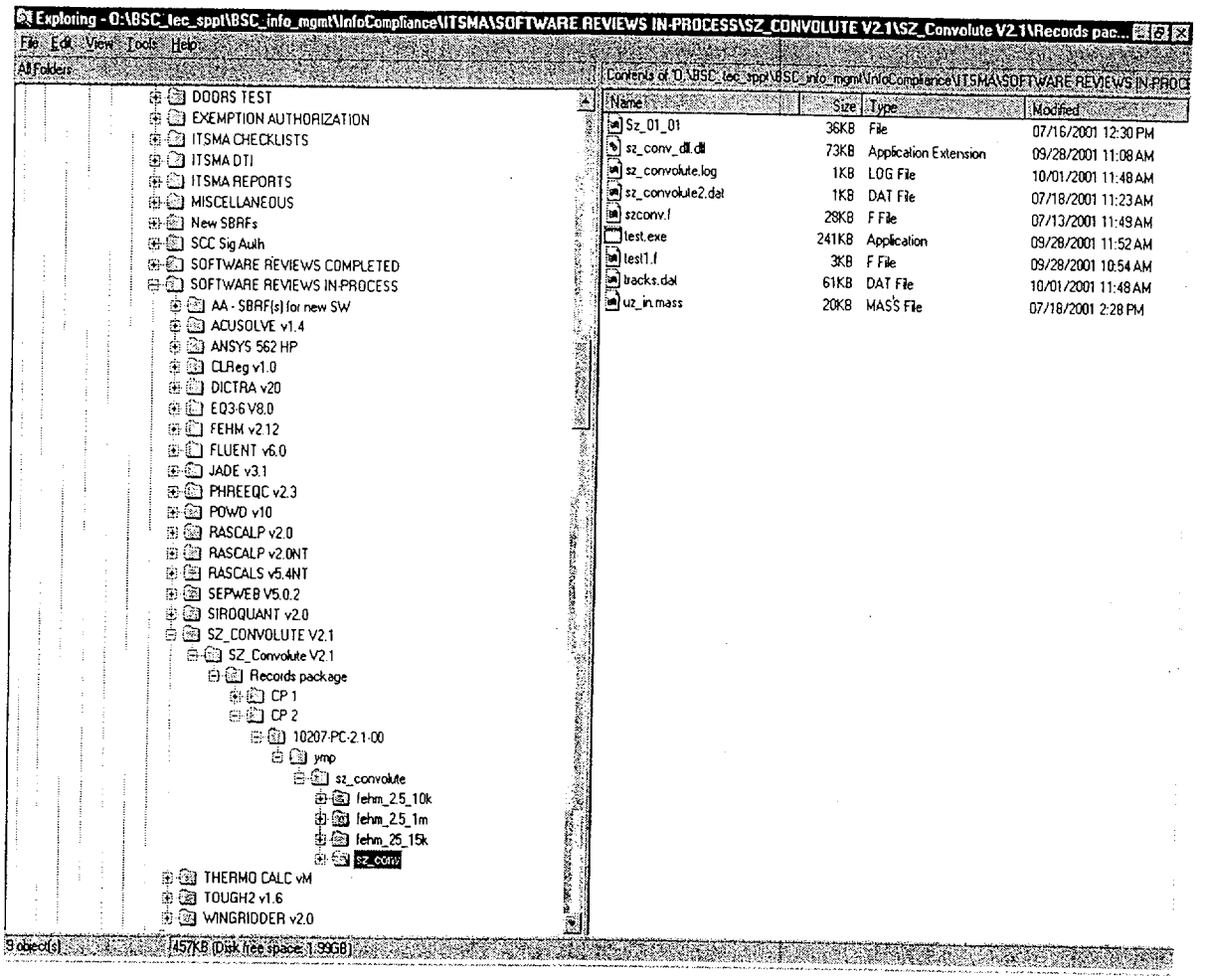

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