



Model Error Resolution Document

QA: QA
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Complete only applicable items.

1. Document Number: ANL-EBS-MD-000049	2. Revision/Addendum: REV03 AD02	3. ERD: 03
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4. Title: Multiscale Thermohydrologic Model	5. No. of Pages Attached: 6
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6. Description of and Justification for Change (Identify affected pages, applicable CRs and TBVs):

This ERD addresses errors documented in CR 12484, CR 12885 and CR 13152 on ANL-EBS-MD-000049 Rev 03 AD02 (SNL 2008 [DIRS 184433]) as detailed in attachments A, B and C.

See Attachments

	Printed Name	Signature	Date
7. Checker	Susan LeStrange	<i>Susan LeStrange</i>	2/24/09
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Attachment A

CR 12484 Evaluation

I. Background Information and Summary

CR 12484 documents an error in DTN: MO0612MEANTHER.000 [DIRS 180552] a product output of ANL-EBS-MD-000049, REV03, AD01 [DIRS 181383]. In the DTN one of the geologic framework model units is referred to as the "Tptprl" layer in both the "Change Document" and the "Footnote" to Table 2 of workbook file "Repository Unit Mean Kthermal.xls," sheet "Summary".

In section 6.3.2.2 of ANL-EBS-MD-000049, REV03, AD01 [DIRS 181383], from which DTN: MO0612MEANTHER.000 [DIRS 180552] is product output, this layer which is part of model layer tsw33 is referred to as "Tptprl". This is also the case in DTN: SN0303T0503102.008 [DIRS 162401], which is included in the footnote to DTN: MO0612MEANTHER.000 [DIRS 180552]. Within the workbook file "NonrepositoryThermalConductivityModel_031403.xls," of DTN: SN0303T0503102.008, this layer is referred to as "Tptprl". And as further confirmation of the correct label for this layer MDL-NBS-GS-000006, Rev 01 [DIRS 170033], of which DTN: SN0303T0503102.008 is product output, also references this layer as "Tptprl".

Buesch et al. 1996 [DIRS 100106], Table 2 lists the stratigraphic nomenclature and symbols for the units of the Paintbrush Group at Yucca Mountain. There is no unit "Tptprl". Therefore it is clear that "Tptprl" is a typographic error and "Tptrl" is correct. Therefore, the correct name for this stratigraphic unit is "Tptrl".

II. Inputs and Software

There are no changes to inputs or Software used in the AMR.

III. Analysis/Proposed Changes to AMR and Output DTNs

The editorial corrections to output DTN: MO0612MEANTHER.000 [DIRS 180552] do not require any changes to ANL-EBS-MD-000049, Rev03 and its Addenda. These issues are directly resolved in the revision to the output DTN. IRAN 6392 tracks these editorial corrections. However, review of ANL-EBS-MD-000049, Rev03 for CR12484 resulted in the following editorial changes that will be documented as part of the extent of condition and resolved in CR12484:

In Section 7.8[a], of ANL-EBS-MD-000049, REV 03, AD 01 [DIRS 181383], line 1:

Change "In Section 7.5[a] of the parent report" to "In Section 7.5 of the parent report".

In Table IV-3a[a], ANL-EBS-MD-000049, REV 03, AD 01 [DIRS 181383], the bulk thermal conductivity (wet and dry) values entered for the GFM2000 layer units *Tptrl* and *Tptpul* are incorrect because they are the combined tsw33 model layer values, not the separate input values

for the GFM2000 layer units. The values for the corresponding columns and rows of Table IV-3a[a], should be changed values shown in the table below:

GFM2000 Layer	Thermal Conductivity, Dry W/m-K	Thermal Conductivity, Wet W/m-K
<i>T_{ptrl}</i>	1.30 ^a	1.81 ^a
<i>T_{ptpul}</i>	1.16 ^a	1.76 ^a

These values represent the *input* values used to derive the combined correct *output* values that had been shown for the tsw33, so there is no impact beyond this tabulated correction.

In addition, the footnote “a” should be modified to read:

“^a Based on Output DTN: MO0612MEANTHER.000 – see Table 1 (the values here are rounded to 2 decimal places), and Table 2 and its corresponding footnote “a””.

To clarify the sources of data presented in Table IV-3a[a], of ANL-EBS-MD-000049, REV 03, AD 01 [DIRS 181383], change the “NOTE” to the following:

NOTE: The values for the nonrepository layers are from DTN: SN0303T0503102.008 [DIRS 162401]. The bulk density values for the repository layers (tsw33, tsw34, tsw35, tsw36, and tsw37) are from *Table 7-10* of DTN: SN0404T0503102.011 [DIRS 169129] (file: *ReadMe_Summary_Rev01.doc*). Some bulk density values shown in green from DTN: SN0404T0503102.011 [DIRS 169129] (file: *ReadMe_Summary_Rev01.doc*, *Table 7-10*) have been rounded to be consistent with the bulk density values from DTN: SN0303T0503102.008 [DIRS 162401]. Mineralogic model units are from *Heat Capacity Analysis Report* (BSC 2004 [DIRS 170003], Tables 6-1 and 6-7). The specific heat capacity for all layers is from DTN: SN0307T0510902.003 [DIRS 164196] for the temperature range of 25°C to 325°C. For the nonrepository layers, the values of specific heat capacity, thermal conductivity, and bulk density for the layers with multiple GFM2000 layers (e.g., pp1) are the arithmetic or harmonic (for tsw33, see section 6.2.13.3[a] for discussion) average of the corresponding GFM2000 layer values. Table IV-3b[a] gives the result of this averaging for bulk density and bulk thermal conductivity.

IV. Impact Evaluation

Documents listed in attachment D were evaluated for impact of proposed changes. These documents do not reference any of the information that is being changed. Therefore, there is no impact to any other technical product as a result of these changes. The changes in this ERD do not impact the conclusion of ANL-EBS-MD-000049 Rev 03 and its addenda, or the text, tables or figures of the SAR.

Attachment B

CR 12885 Evaluation

I. Background Information and Summary

Within the Multiscale Thermohydrologic Model (MSTHM; ANL-EBS-MD-000049 Rev 03 [DIRS 173944]) and within its addendum (ANL-EBS-MD-000049 Rev 03 AD01 [DIRS 181383]) an erroneous citation to a non-existent figure was found. This error occurs on pages 6-151 and 6-46[a] of the MSTHM in the same context of discussing the low-probability seismic scenario where the MSTHM cites this figure (i.e., "Figure 139f") that is referred to be in the Drift Degradation Analysis (BSC 2004 [DIRS 166107]). "Figure 139f" does not exist in the Drift Degradation Analysis (BSC 2004 [DIRS 166107]), but was in the previous revision. The content of that previous figure appears to exist in the Drift Degradation Analysis (BSC 2004 [DIRS 166107]) as "Figure 6-171", so the MSTHM needs to be corrected to cite the correct figure in the drift degradation analysis (BSC 2004 [DIRS 166107]).

II. Inputs and Software

There are no changes to inputs or Software used in the AMR.

III. Analysis/Proposed Changes to AMR and DIRS

On pages 6-151 (ANL-EBS-MD-000049 REV 03 [DIRS 173944]) and 6-46[a] of ANL-EBS-MD-000049 REV 03 AD01 [DIRS 181383]:

Change "Figure 139f" to "Figure 6-171f".

Changes to DIRS

DIRS 173944 entry 32 for BSC 2004 [DIRS 166107]:

In entry for "used from" change "Fig. 139f" to "Fig. 6-171f".

DIRS 181383 entry 11 for BSC 2004 [DIRS 166107]:

In entry for "used from" change "Fig. 139f" to "Fig. 6-171f".

IV. Impact Evaluation

Documents listed in attachment D were evaluated for impact of proposed changes. These documents do not reference any of the information that is being changed. Therefore, there is no impact to any other technical product as a result of these changes. The changes in this ERD do not impact the conclusion of ANL-EBS-MD-000049 Rev 03 and its addenda, or the text, tables or figures of the SAR.

Attachment C

CR 13152 Evaluation

I. Background Information and Summary

The following error was found while researching the software used to develop DTNs MO0612MEANTHER.000 and MO0702PAGLOBAL.000.

Both of these DTNs are product output of ANL-EBS-MD-000049, REV 03, AD 01 [DIRS 181383]. Section 3[a] (Use of Software) of this AMR provides information on the software used by this model, specifically NUFT v4.0.

Table 3-1[a] (Qualified/Baseline Software Used) states that the Platform used for NUFT v4.0 (STN: 11228-4.0-00) is Sun OS 5.8; however, Section 3.1.1.9[a] (NUFT v3.0s and 4.0) on pg. 3-3[a] of Section 3[a] states: "NUFT v4.0 was run on the Lawrence Livermore National Laboratory (LLNL) uP supercomputer using operating system AIX5.3CSM1.5, the LLNL Thunder supercomputer using operating system AIX5.2PSSP3.5, and the LLNL Snowbert supercomputer using the CHAOS3.1 operating system."

There appears to be a conflict on which platform was used to run NUFT 4.0. However, DIRS and SCM documentation show that NUFT V. 4.0. STN: 11228-4.0-00 [DIRS 180382] is qualified for use on the SUN O.S. 5.8, AIX5.2 PSSP3.5, AIX5.3 CSM1.5, CHAOS 3.1 platforms. Therefore, the information in Table 3-1[a] needs to be revised.

II Inputs and Software

There are no changes to inputs or Software used in the AMR.

III. Analysis/Proposed Changes to AMR

On page 3-1[a] of ANL-EBS-MD-000049, REV 03, AD 01 [DIRS 181383], make the following changes:

In Table 3-1[a], column "Platform Used" row "NUFT v4.0", add "AIX 5.2 PSSP3.5, AIX5.3 CSM1.5, CHAOS 3.1".

IV. Impact Evaluation

Documents listed in attachment D were evaluated for impact of proposed changes. These documents do not reference any of the information that is being changed. Therefore, there is no impact to any other technical product as a result of these changes. The changes in this ERD do not impact the conclusion of ANL-EBS-MD-000049 Rev 03 its addenda, or the text, tables or figures of the SAR.

Attachment D

Documents that Cite ANL-EBS-MD-000049 Rev 03 and its Addenda.

Documents that Cite DIRS 184433 (ANL-EBS-MD-000049 Rev 03 Addendum 02)

ANL-DS0-NU-000001 Rev. 00; Screening Analysis of Criticality Features, Events, and Processes for License Application.
ANL-EBS-MD-000003 Rev. 03; General Corrosion and Localized Corrosion of Waste Package Outer Barrier.
ANL-EBS-NU-000010 Rev. 00; CSNF Loading Curve Sensitivity Analysis.
ANL-EBS-PA-000011 Rev. 00; Postclosure Design Input Parameters for Engineered Barrier System In-Drift Configuration.
ANL-WIS-MD-000024 Rev. 01; Postclosure Nuclear Safety Design Bases.
ANL-WIS-MD-000027 Rev. 00; Features, Events, and Processes for the Total System Performance Assessment: Analyses.
CAL-DN0-NU-000002 Rev. 00C, Addendum 01; Waste Package Flooding Probability Evaluation.
CAL-DN0-NU-000002 Rev. 00C; Waste Package Flooding Probability Evaluation.
MDL-NBS-HS-000023 Rev. 01, Addendum 01; Simulation of Net Infiltration for Present-Day And Potential Future Climates.
TDR-PCS-SE-000001 Rev. 05, Addendum 01; Performance Confirmation Plan.
LA-SAR; LA Safety Analysis Report

Documents that Cite DIRS 181383 (ANL-EBS-MD-000049 Rev 03 Addendum 01)

ANL-EBS-MD-000033 Rev. 06; Engineered Barrier System: Physical and Chemical Environment.
ANL-EBS-MD-000037 Rev. 04, Addendum 01; In-Package Chemistry Abstraction.
ANL-EBS-MD-000049 Rev. 03, Addendum 02; Multiscale Thermohydrologic Model.
ANL-NBS-HS-000057 Rev. 00; Postclosure Analysis of the Range of Design Thermal Loadings.
ANL-WIS-PA-000001 Rev. 03; EBS Radionuclide Transport Abstraction.
MDL-EBS-MD-000001 Rev. 00, Addendum 01; In-Drift Natural Convection and Condensation.
MDL-NBS-HS-000001 Rev. 05; Drift-Scale the Seepage Model.
MDL-NBS-HS-000006 Rev. 03, ACN 01, Addendum 01; UZ Flow Models and Submodels
MDL-NBS-HS-000006 Rev. 03; UZ Flow Models and Submodels.
MDL-WIS-AC-000001 Rev. 00; Mechanical Assessment of Degraded Waste Packages and Drip Shields Subject to Vibratory Ground Motion.
MDL-WIS-PA-000003 Rev. 03; Seismic Consequence Abstraction.
MDL-WIS-PA-000005 Rev. 00, Addendum 01; Total System Performance Assessment Model/Analysis for the License Application.
MDL-WIS-PA-000005 Rev. 00, MiscId 01; Total System Performance Assessment Model/Analysis for the License Application - Volume I.
MDL-WIS-PA-000005 Rev. 00, MiscId 02; Total System Performance Assessment Model/Analysis for the License Application - Volume II.
MDL-WIS-PA-000005 Rev. 00, MiscId 03; Total System Performance Assessment

Model/Analysis for the License Application - Volume III.
TDR-MGR-MD-000037 Rev. 02; Postclosure Modeling and Analyses Design Parameters.
TDR-TDIP-ES-000006 Rev. 00; Total System Performance Assessment Data Input Package for Requirements Analysis for Transportation Aging and Disposal Canister and Related Waste Package Physical Attributes Basis for Performance Assessment.
TDR-TDIP-ES-000009 Rev. 00; Total System Performance Assessment Data Input Package for Requirements Analysis for DOE SNF/HLW and Naval SNF Waste Package Physical Attributes Basis for Performance Assessment.
TDR-WIS-PA-000014 Rev. 00; TSPA Information Package for the Draft SEIS.

Documents that Cite DIRS 173944 (ANL-EBS-MD-000049 Rev 03)

ANL-EBS-GS-000002 Rev. 01; Geochemistry Model Validation Report: External Accumulation Model.
ANL-EBS-MD-000037 Rev. 04; In-Package Chemistry Abstraction.
ANL-EBS-MD-000074 Rev. 01; Analysis of Dust Deliquescence for FEP Screening.
ANL-EBS-MD-000075 Rev. 01; Thermal Management Flexibility Analysis.
CAL-DS0-NU-000001 Rev. 00A; Steady-State Criticality Consequence Model Report.
CAL-WIS-AC-000001 Rev. 0B; Mechanical Assessment of the Waste Package Subject to Vibratory Ground Motion.
CAL-WIS-AC-000004 Rev. 0A; Creep Deformation of the Drip Shield.
MDL-NBS-HS-000007 Rev. 03; Mountain-Scale Coupled Processes (TH/THC/THM) Models.
MDL-NBS-HS-000020 Rev. 02; Particle Tracking Model and Abstraction of Transport Processes.
MDL-NBS-HS-000023 Rev. 01; Simulation of Net Infiltration for Present-Day and Potential Future Climates.