Model Error Resolution Document

Complete only applicable items.

INITIATION

1. Originator:	2. Date:	3. ERD No.
Jerry McNeish	May 16, 2008	MDL-WIS-PA-000005 ERD 03

4. Document Identifier:	5. Document Title: Total System Performance Assessment Model/Analysis for the License Application
MDL-WIS-PA-000005 REV 00 and AD 01	

6. Description of and Justification for Change (Identify applicable CRs and TBVs):

This Error Resolution Document (ERD) is provided to update the *Total System Performance Assessment for the License Application* (TSPA-LA) Rev 00 document and addendum (AD 01) to correct issues identified in the following condition reports (CRs). The minor corrections identified are necessary to add clarity and strengthen the discussion within both Rev 00 and Addendum (AD01) of the TSPA-LA document.

CR 12059—Typographical Error Found in a Reference—

In Section 7.9 of the TSPA-LA Rev 00 document, a typographical error was found in a reference (DIRS 177407) on page T7.9-12 of Table 7.9-1. The reference cited Section 6.2.4.6 when the appropriate citation should have been to Section 6.3.4.6. The first row and second column of Table 7.9-1 on page T7.9-12, are replaced with the following:

> See pages 364 and 365 of Booth (2006 [DIRS 176638]) for the Project technical position on the comment where the Project justified the saturation states used in the different parts of EBS. Nonetheless, the Project planned the additional work to further enhance consistency of the degree of water saturation across the EBS. The work has been completed as planned and is reported in the *EBS Radionuclide Transport Abstraction* (SNL 2007 [DIRS 177407], Sections 6.3.4.6 and 6.5.2.2); and *In-Package Chemistry Abstraction* (SNL 2007 [DIRS 180506], Sections 6.6.1[a] and 6.10.9.1 [a]) model reports.

There is no impact associated with this correction outside of the TSPA-LA document.

CR 12112—Evaluation of Issues Related to FEHM Software—

As noted in CR 12112, filtration of colloids with irreversibly attached radionuclides in the unsaturated zone rock matrix, was not implemented in the TSPA-LA model. This section of the ERD is written to remove all references to this filtration process in the TSPA-LA document and addendum. Omitting this process of filtration of colloids at the rock matrix unit boundaries is conservative and only has a small impact on TSPA-LA total dose calculations. The table in Attachment 1 describes the changes to be made throughout the TSPA-LA document to clarify this issue.

The impact for this correction has been evaluated and determined to be limited to minor corrections to MDL-NBS-HS-000020, Rev 02, AD02; ANL-WIS-MD-000027, Rev 00, ACN 01; and the SAR. The documents are being corrected via their respective ERDs. The SAR authors are aware of the corrections and will update the SAR as the ERDs are processed.

CR 12120—Misinterpretation of EPRI analyses in TSPA-LA Document and Addendum—

There is no impact associated with this correction outside of the TSPA-LA AMR, where it is limited to discussion and supporting figures in Rev 00 and AD01.

CONCURRENCE

	Printed Name	Signature	Date
7. Checker	David Mohr	David E Mohr	5/22/08
8. QCS/QA Reviewer	Robert Spencer	Robert E Spencer	5/22/08
APPROVAL			
9. Originator	Jerry McNeish	Jerry McNeish	5.22.08
10. Responsible Manager	Paul Dixon	Paul Q	5-22-08

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6. Description of and Justification for Change (continued):

The following changes are made to the TSPA-LA Addendum (AD-01):

Replace Figure 7.7.3-3[a] (p. F7.7-128[a]) with the first figure shown in Attachment 2. The corrected figure is included in a new output DTN MO0805TSPACPLT.000 [DIRS 185506].

Replace the 2nd paragraph in Section 7.7.3.5[a] with the following paragraph:

In the EPRI TSPA Analysis, the computed failure distribution curves for the nominal scenario for the WP are shown on Figure 5-7 in Apted and Ross (2005 [DIRS 182229], "Updated WP OK, DS OK"), indicating onset of nominal WP failures at about 500,000 years. The EPRI TSPA Analysis only considers 8,160 CSNF WPs, of which about 10% or approximately 816 WP are failed at 1,000,000 years (Apted and Ross 2005 [DIRS 182229], Figure 5-7 "Updated WP OK, DS OK"). In the TSPA-LA Nominal Scenario Class, the probabilistic projections of WP breaches exhibit a few realizations with a SCC occurring before 100,000 years (Section 8.2.1[a]). However, as Figure 7.7.3-2[a] indicates, by 500,000 years approximately 15% of the waste packages have some type of breach, with about 54% or approximately 6280 failed waste packages on average by 1,000,000 years. This is a higher failure rate than in the EPRI performance assessment.

Replace the 1st paragraph in M3.3[a] with the following paragraph:

In the Electric Power Research Institute (EPRI) TSPA, the computed failure distributions curves for the nominal scenario for the WP are shown on Figure 5-7 in Apted and Ross (2005 [DIRS 182229], "Updated WP OK, DS OK"), indicating onset of nominal WP failures at about 500,000 years. The EPRI TSPA Analysis only considers 8,160 CSNF WPs, of which about 10% or approximately 816 WP are failed at 1,000,000 years (Apted and Ross 2005 [DIRS 182229], Figure 5-7 "Updated WP OK, DS OK"). In the TSPA-LA Nominal Scenario Class, the probabilistic projections of WP breaches exhibit a few realizations with a stress corrosion cracking penetrating crack occurring before 100,000 years (Section 8.2.1[a]). However, as Figure 7.7.3-2[a] indicates by 500,000 years approximately 15% of the waste packages have some type of breach, with about 54% or approximately 6280 failed waste packages on average by 1,000,000 years. This is a higher failure rate than in the EPRI performance assessment.

The following additional changes are made to the TSPA-LA Rev 00:

In Section M3.7, 2nd paragraph, add the following sentence to the end of the paragraph:

In addition, the EPRI TSPA Analysis uses a value of 0.37 m/yr for the groundwater specific discharge (Apted and Ross 2005 [DIRS 182229], Section 5.5.2.4.2).

Section M3.9, replace the 1st paragraph with the following:

The computed mean radionuclide doses for the EPRI nominal scenario are shown on Figure 5-10 in Apted and Ross (2005 [DIRS 182229]). In comparison, the results of the computed mean doses for the TSPA-LA combined Nominal and Waste Package Early Failure Modeling Cases are shown on Figure 7.7.3-3. The results indicate a similar pattern for the nominal scenario characterized by a significant increase in dose after several hundred thousand years. The early failure dose is represented by the dose increase after about 500 years in the TSPA-LA Model (Figure 7.7.3-3), which does not appear in the EPRI TSPA Analysis (Apted and Ross 2005 [DIRS 182229], Figure 5-10) until about 5,000 years. Overall, the maximum total mean annual dose in the nominal EPRI results is about 2.0×10^{-2} mrem/yr at 1,000,000 years compared to about 5.5×10^{-1} mrem/yr at about 740,000 years for the combined nominal and early-failure modeling cases in the TSPA-LA Model. The main contributor to total dose at late time is ^{129}I in both cases.

Add the following bullets to the list in Section M3.9, paragraph 2:

- Groundwater specific discharge in the SZ.
- Number of corrosion-failed waste packages

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6. Description of and Justification for Change (continued):

Replace Section M3.9 4th paragraph with the following paragraph:

The EPRI TSPA Analysis only accounts for CSNF waste and considers failure of DSs, WPs, and cladding, whereas the TSPA-LA Model accounts for CSNF, DSNF, and HLW, but does not take credit for cladding of CSNF WPs. Consequently, the overall dose release in the EPRI TSPA Analysis is delayed both during the early failure scenario and for the nominal scenario. The WP failure curves in the EPRI TSPA Analysis indicate that about 10% or approximately 816 WP are failed at 1,000,000 years (Apted and Ross 2005 [DIRS 182229], Figure 5-7 "Updated WP OK, DS OK"), whereas the TSPA-LA Model results indicate that by 500,000 years approximately 15% of the waste packages have some type of breach, with about 54% or approximately 6,280 failed waste packages on average by 1,000,000 years (Figure 8.3-5[a]). The lower rate of waste package failures by stress corrosion cracking and general corrosion in the EPRI performance assessment further contributes to later onset and lower values of dose. In addition, the EPRI TSPA Analysis uses a value of 0.37 m/yr for the groundwater specific discharge (Apted and Ross 2005 [DIRS 182229], Section 5.5.2.4.2), whereas the TSPA-LA Model uses a distribution of values ranging between 0.3 and 7.5 m/yr (SNL 2008 [DIRS 183750], Table 6-6). The larger values of groundwater specific discharge used in the TSPA-LA Model contribute to earlier arrival of radionuclides in the groundwater, and hence to earlier observance of dose to the RMEI.

Replace Figure 7.7.3-3 with the 2nd figure shown in Attachment 2. The corrected figure is included in a new output DTN MO0805TSPACPLT.000 [DIRS 185506].

Replace the 1st paragraph in 7.7.3.11 with the following paragraph:

The computed mean radionuclide doses for the EPRI nominal scenario is given on Figure 5-10 in Apted and Ross (2005 [DIRS 182229]). In comparison, the results from the TSPA-LA Model for the computed mean annual doses for the combined Nominal Scenario Modeling Case and the Waste Package EF Modeling Case are shown on Figure 7.7.3-3. The results indicate a similar pattern for the nominal scenario characterized by a significant increase in dose after several hundred thousand years. The early failure dose is represented by the dose increase after about 500 years in the TSPA-LA Model (Figure 7.7.3-3), which does not appear in the EPRI TSPA Analysis (Apted and Ross 2005 [DIRS 182229], Figure 5-10) until about 5,000 years. The maximum total annual dose in the EPRI nominal scenario is about 2.0×10^{-2} mrem/yr at 1,000,000 years compared to about 5.5×10^{-1} mrem/yr at about 740,000 years for the combined nominal and early-failure modeling cases in the TSPA-LA Model. The main contributor to mean annual dose at late time is ^{129}I in both cases.

Add the following bullet to the list in 7.7.3.11:

- Number of corrosion-failed waste packages.

Add the following sentence to Section 7.7.3.11, 4th paragraph, after the 2nd sentence:

The lower rate of waste package failures by stress corrosion cracking and general corrosion in the EPRI performance assessment further contributes to later onset and lower values of dose.

Make the following changes to Section 7.7.3.11, 5th paragraph:

Change 26 to 32.

Change M-4 to M-5.

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ATTACHMENT 1—CORRECTED COLLOID FILTRATION TEXT

Text Change	Volume	Section Number	Page Number	Table or Figure Number
Volume I				
Remove "filtration, " in Section ES7.1.6	Volume I	ES7.1.6	ES-24	
Remove "filtration," in Section 1.5.1.6	Volume I	1.5.1.6	1-24	
Remove 5th bullet on this page.	Volume I	6.1.4.9	6.1.4-22	
Remove entire sentence that begins with "In addition, colloid filtration…."	Volume I	6.1.4.9	6.1.4-23	
In colloid transport bullet, 3rd sentence, delete the phrase "and permanent filtration…units of differing pore size"	Volume I	6.3.9.1	6.3.9-2	
In 1st paragraph, delete the following text starting with "and the colloids" and includes the next five sentences., and ends with "…TSPA-LA Model"	Volume I	6.3.9.1	6.3.9-3	
Remove 6th bullet on this page.	Volume I	6.3.9.2	6.3.9-4	
Remove entire 2nd full paragraph that starts with "For irreversible colloids…".	Volume I	6.3.9.2	6.3.9-10	
Remove entire first row of table and the first two notes.	Volume I		T6.3.9-8	Table 6.3.9-8
Remove entire Table.	Volume I		T6.3.9-9	Table 6.3.9-9
Volume II				
Remove 6th bullet in the first row, third column.	Volume II		T7.7.2-8	Table 7.7.2-1
Volume III Appendices				
In final paragraph; 2nd sentence, delete "and filtration at matrix interfaces". 3rd sentence, delete "and filtration" and change "processes are" to "process is"	Volume III	C6.6.1	C-68	
In top paragraph, 2nd full sentence, delete "or the filtration at matrix interfaces"	Volume III	C6.6.1	C-69	
Remove the 2nd sentence in the first paragraph for the TSPA Inclusion Explanation column for FEP 2.2.08.10.0B, Colloid transport in the UZ.	Volume III		I-77	Table I-2
1st paragraph, after colloid interface-filtration model, and 3rd paragraph at the end of the (4) phrase, add the following note: "(Note that this option is not operational in FEHM versions 2.24-01 and 2.25 as described in SPR 20080505001)."	Volume III	F2.1.2	F-3	
In Section F2.1.9, after section heading add the following note prior to the 1st paragraph: "(Note that this option is not operational in FEHM versions 2.24-01 and 2.25 as described in SPR 20080505001)."	Volume III	F2.1.9	F-8	
Add a footnote letter [a] to the last two lines of the 2nd row inputs column next to the two filtration words.	Volume III		F-20	Table F-2
Add a footnote letter [a] to the Inputs column next to the word "sizes" in the 17th line.	Volume III		F-24	Table F-2
Add the following footnote to the bottom of Table F-2: [a] Colloid filtration at rock matrix unit boundaries is not implemented in TSPA-LA Model (see SPR 20080505001).	Volume III		F-26	Table F-2

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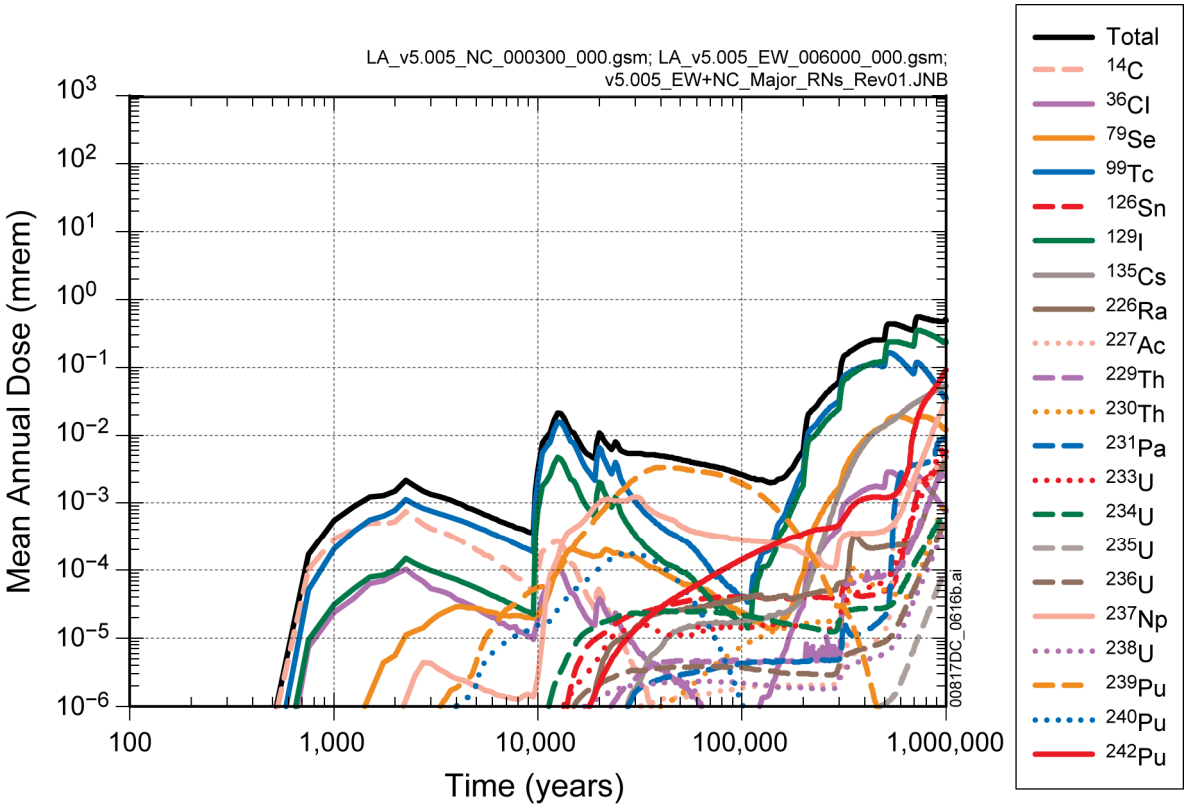
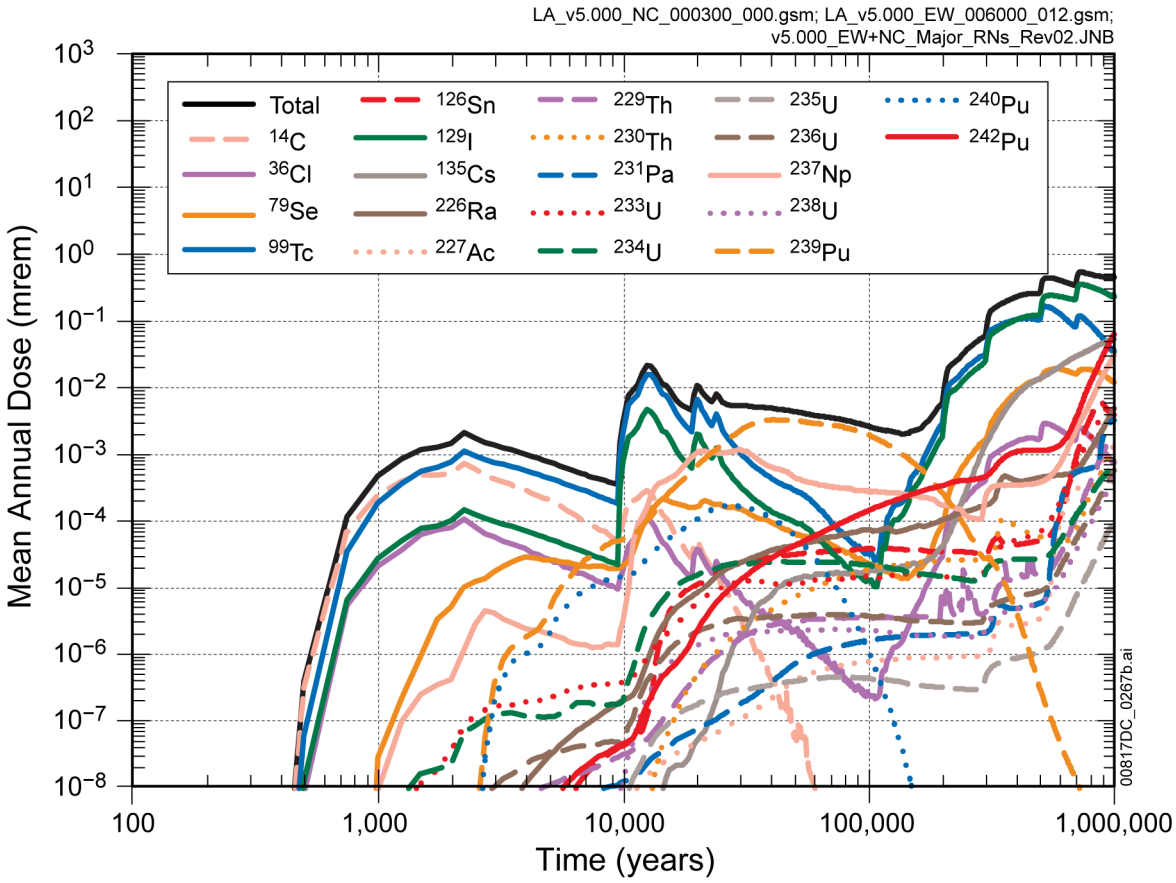
ATTACHMENT 2—CORRECTED FIGURES



Source: Output DTNs: MO0710ADTSPAWO.000 [DIRS 183752] and MO0805TSPACPLT.000 [DIRS 185506].

Figure 7.7.3-3[a]. TSPA-LA Mean Annual Dose for Major Radionuclides for the Combined Early Failure and Nominal Scenario Classes



Source: Output DTNs: MO0709TSPAREGS.000 [DIRS 182976] and MO0805TSPACPLT.000 [DIRS 185506].

Figure 7.7.3-3. TSPA-LA Mean Annual Dose for Major Radionuclides for the Combined Early Failure and Nominal Scenario Classes