



Scientific Analysis/Calculation Error Resolution Document

Complete only applicable items.

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3-31-08

INITIATION

1. Originator: John A. McClure	2. Date: 03-21-2008	3. ANL-DS0-NU-000001 ERD 01
4. Document Identifier: ANL-DS0-NU-000001 REV 00	5. Document Title: Screening Analysis of Criticality Features, Events, and Processes for License Application	

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

The following changes/corrections are posted to correct the conditions identified in ANL-DS0-NU-000001 REV 00 are given in the attachments to this ERD.

- 6A. Change an incorrect citation generated by citing a draft version of ANL-WIS-MD-000026 REV 00 to permit resolution of TBV-9190.
- 6B. Revise a citation of ANL-EBS-NU-000010 REV 00 to permit resolution of TBV-9193.
- 6C. Change an incorrect citation generated by citing a Revision 00 of DTN: MO0706SPAPEPLA.001 to permit resolution of TBV-9192.
- 6D. Change an incorrect citation generated by citing an unqualified version of DTN: MO0709TSPALOCO.000 to justify resolution of TBV-9207.
- 6E. Revise a citation of MDL-WIS-PA-000005 REV 00 identifying Appendix O as a partial source for documentation of the TSPA localized corrosion uncertainty analysis methodology to permit resolution of TBV-9208.
- 6F. Revise a citation of an unqualified version of DTN: SN0705WFLOWSCC.001 to permit resolution of TBV-9242.
- 6G. Correct typographical errors observed during TBV resolution verification and improve clarification of conditions for criticality.
- 6H. Revise citations of ANL-DSH-NU-000001 REV 00 to permit cancellation of TBV-9195.

CONCURRENCE

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APPROVAL

9. Originator	John A. McClure	<i>John A. McClure</i>	03/28/2008
10. Responsible Manager	Clifford L. Howard <i>PRD 3-31-08 Paul Dixon</i>	<i>Paul Dixon</i>	3-31-08

6A. Resolution of TBV-9190

II. Background Information Summary

In the approved document, ANL-DS0-NU-000001 REV 00, information initially cited from a draft version of ANL-WIS-MD-000026 was moved to a second independent document with separate title and Document Identifier. In addition, the sections in ANL-WIS-MD-000026 REV 00 were also reorganized.

II. Inputs and/or Software

N/A

III. Analysis and Results

The screening justification for several FEPs from the draft version of SNL 2008 *Features, Events, and Processes for the Total System Performance Assessment: Methods* ANL-WIS-MD-000026 REV 00 [DIRS 179476] were cited as input to Screening Analysis of Criticality Features, Events, and Processes for License Application (SNL 2008 [DIRS 173869]) which were subsequently moved to *Features, Events, and Processes for the Total System Performance Assessment: Analyses*. ANL-WIS-MD-000027 REV 00 (SNL 2008 [DIRS 183041]) and included in the output DTN: MO0706SPAPEPLA.001 ([DIRS 185200], folder FEPs_be.zip, file *FEP_AMR.doc*). The sections from ANL-DS0-NU-000001 REV 00 affected are as follows: 4.1.7, 4.1.14, 6.3, 6.3.1, 6.4.2, 6.4.2.3, 6.5, and Appendix I. The citation of FEP 2.1.03.03.0C should be deleted from Section 6.4.2 of ANL-DS0-NU-000001 REV 00 since ANL-WIS-MD-000027 REV 00 does not include this FEP. The reference for these citations in ANL-DS0-NU-000001 REV 00 should be changed to DTN: MO0706SPAPEPLA.001 [DIRS 185200], folder FEPs_be.zip, file *FEP_AMR.doc* which has been checked for correctness. The reference section for ANL-DS0-NU-000001 REV 00 should be updated to include the citations of DIRS 185200.

The FEP scenario class development in ANL-WIS-MD-000026 REV 00 is discussed in Section 6.3. The citation of Section 6.4 in Section 1.2 of ANL-DS0-NU-000001 should be deleted.

FEP 2.1.03.03.0B was cited in Section 6.4.2 of ANL-DS0-NU-000001 REV 00 but not included in the DIRS record. A citation of FEP 2.1.03.03.0B from DTN: MO0706SPAPEPLA.001 [DIRS 185200] was added to the revised DIRS report.

Revision 000 of DTN: MO0706SPAPEPLA.001 was superseded in the TDMS Database by Revision 001. Citations of DTN: MO0706SPAPEPLA.001 [DIRS 181613] should be changed to DTN: MO0706SPAPEPLA.001 ([DIRS 185200], folder FEPs_be.zip, file *FEPs_be.mdb*) and DIRS 181613 deleted from the DIRS record. Sections in ANL-DS0-NU-000001 REV 00 affected are 1.2, 4.1, 8.3, and Table 1.2-1.

The corrected DIRS report and additions per SCI-PRO-004 are attached to this document. The DIRS report for ANL-DS0-NU-000001 REV 00 should be updated.

The resolution plan for TBV-9190 states the TBV “will be resolved when ANL-WIS-MD-000026 REV 00 is approved and citations verified”. ANL-WIS-MD-000026 REV 00 and DTN: MO0706SPAPEPLA.001 are both approved and, with the above document and DIRS changes, the citations are corrected.

IV. Impact Evaluation

These changes do not affect any result or conclusion, nor do they impact any other technical product. Products evaluated for impact include *Postclosure Nuclear Safety Design Bases*. ANL-WIS-MD-000024 REV 01 [DIRS 177464], *Features, Events, and Processes for the Total System Performance Assessment: Analyses*. ANL-WIS-MD-000027 REV 00 [DIRS 183041], and *Engineered Barrier System Features, Events, and Processes*. ANL-WIS-PA-000002 REV 05 [DIRS 175041].

6B. Resolution of TBV-9193

I. Background Information Summary

In Section 6.2 of the approved document, ANL-DS0-NU-000001 REV 00, the document, SNL 2008 ([DIRS 182788], Section 6.2.4.1), was improperly cited as the source for asserting that the design basis configuration bounds the various limiting configurations for the criticality FEP scenarios.

II. Inputs and/or Software

N/A

III. Analysis and Results

The citation for the source supporting the assertion that the design basis configuration bounds the various limiting configurations for the criticality FEP scenarios should be changed to Section 7 of SNL 2008 [DIRS 182788] which states that “Parameter sensitivity studies show that the base case representation provides a bounding description of the postclosure conditions of the waste package.” The section affected from ANL-DS0-NU-000001 REV 00 is Section 6.2. The affected section, i.e., Section 6.2, of ANL-DS0-NU-000001 REV 00 should be updated.

The corrected DIRS report per SCI-PRO-004 is attached to this document and the DIRS report for ANL-DS0-NU-000001 REV 00 should be updated.

The resolution plan for TBV-9193 states the TBV “will be resolved when ANL-EBS-NU-000010 REV 00 is approved and citations verified”. ANL-EBS-NU-000010 REV 00 is approved and, with the above citation change, the citation is corrected.

IV. Impact Evaluation

These changes do not affect any result or conclusion, nor do they impact any other technical product. Products evaluated for impact include *Postclosure Nuclear Safety Design Bases*. ANL-WIS-MD-000024 REV 01 [DIRS 177464], *Features, Events, and Processes for the Total System Performance Assessment: Analyses*. ANL-WIS-MD-000027 REV 00 [DIRS 183041], and *Engineered Barrier System Features, Events, and Processes*. ANL-WIS-PA-000002 REV 05 [DIRS 175041].

6C. Resolution of TBV-9192

I. Background Information Summary

The approved document, ANL-DS0-NU-000001 REV 00, cites “*File MO0706SPAFEP_001.zip*”, Revision 000 of the unqualified DTN: MO0706SPAFEPLA.001 [DIRS 181613]. The file name was changed in Revision 001 of DTN: MO0706SPAFEPLA.001.

II. Inputs and/or Software

N/A

III. Analysis and Results

The FEPs list from Revision 000 of DTN: MO0706SPAFEPLA.001 [DIRS 181613] cited in ANL-DS0-NU-000001 Rev 00 [DIRS 173869] was given in file “*MO0706SPAFEPLA_001.zip*”. The file name was changed to “*FEPs_be.zip*” in the approved DTN (Revision 001) and a new DIRS number assigned to the DTN, i.e., DIRS 185200. The DIRS report should be updated and citations of the file changed in ANL-DS0-NU-000001. The sections from ANL-DS0-NU-000001 REV 00 affected are as follows: 1.2, 4.1, 8.3, and Table 1.2-1. The affected sections, i.e., Sections 1.2, 4.1, 8.3, and Table 1.2-1, of ANL-DS0-NU-000001 REV 00 should be updated.

The corrected DIRS report per SCI-PRO-004 is attached to this document and the DIRS report for ANL-DS0-NU-000001 REV 00 should be updated.

The resolution plan for TBV-9192 states the TBV “will be resolved when MO0706SPAFEPLA.001 is qualified and citations verified”. DTN: MO0706SPAFEPLA.001 was qualified by creating a new revision with a new DIRS entry. The citations as revised by this ERD are corrected.

IV. Impact Evaluation

These changes do not affect any result or conclusion, nor do they impact any other technical product. Products evaluated for impact include *Postclosure Nuclear Safety Design Bases*. ANL-WIS-MD-000024 REV 01 [DIRS 177464], *Features, Events, and Processes for the Total System Performance Assessment: Analyses*. ANL-WIS-MD-000027 REV 00 [DIRS 183041], and *Engineered Barrier System Features, Events, and Processes*. ANL-WIS-PA-000002 REV 05 [DIRS 175041].

6D. Resolution of TBV-9207

I. Background Information Summary

The approved document, ANL-DS0-NU-000001 REV 00, cites Files “*CSNF_bin[x].txt*” and “*CDSP_bin[x].txt*” from the unqualified DTN: MO0709TSPALOCO.000 [DIRS 182994] as the source for partial documentation of the TSPA localized corrosion uncertainty analysis. The file names were changed in the qualified DTN: MO0709TSPALOCO.000 and documentation of the analysis presented in a separate file.

II. Inputs and/or Software

N/A

III. Analysis and Results

The localized corrosion *.txt file names from the qualified version of DTN: MO0709TSPALOCO.000 [DIRS 182994] are given in the folder Additional_Information/LC_for_Criticality as:

“Lith_Fraction_LC_CS NF_Bin?.txt”,
“Lith_Fraction_LC_CDSP_Bin?.txt”,
“NonLith_Fraction_LC_CS NF_Bin?.txt”, and
“NonLith_Fraction_LC_CDSP_Bin?.txt” (where ? =1, 2, 3, 4, 5).

A citation of the file “*TSPA Implementation for LC Initiation Uncertainty Analysis.doc*” describing the localized corrosion analysis methodology was added to the DIRS record. The DIRS report should be updated and citations revised in ANL-DS0-NU-000001 to change these file names and to add a citation of the file, “*TSPA Implementation for LC Initiation Uncertainty Analysis.doc*”, as a partial source of documentation of the TSPA localized corrosion uncertainty analysis. The section from ANL-DS0-NU-000001 REV 00 affected is 4.1.13. The affected section, i.e., Sections 4.1.13, of ANL-DS0-NU-000001 REV 00 should be updated.

The corrected DIRS report per SCI-PRO-004 is attached to this document and the DIRS report for ANL-DS0-NU-000001 REV 00 should be updated.

The resolution plan for TBV-9207 states the TBV “will be resolved when MO0709TSPALOCO.000 is qualified and citations verified”. DTN: MO0709TSPALOCO.000 has been qualified. The citations as revised by this ERD are corrected.

IV. Impact Evaluation

These changes do not affect any result or conclusion, nor do they impact any other technical product. Products evaluated for impact include *Postclosure Nuclear Safety Design Bases*. ANL-WIS-MD-000024 REV 01 [DIRS 177464], *Features, Events, and Processes for the Total System Performance Assessment: Analyses*. ANL-WIS-MD-000027 REV 00 [DIRS 183041], and *Engineered Barrier System Features, Events, and Processes*. ANL-WIS-PA-000002 REV 05 [DIRS 175041].

6E. Resolution of TBV-9208

I. Background Information Summary

The approved document, ANL-DS0-NU-000001 REV 00, cites Appendix O from the draft version of MDL-WIS-PA.000005 REV 00 AD 01 [DIRS 183478] as the source for documentation of the TSPA localized corrosion uncertainty analysis. Additional documentation is provided in the qualified DTN: MO0709TSPALOCO.000 [DIRS 182994].

II. Inputs and/or Software

N/A

III. Analysis and Results

The Input Description for DIRS 183478 should be updated to state that Section O provides a description of the LC analysis methodology. The section from ANL-DS0-NU-000001 REV 00 affected is 4.1.13. The affected section, i.e., Section 4.1.13 of ANL-DS0-NU-000001 REV 00 should be updated.

The corrected DIRS report per SCI-PRO-004 is attached to this document and the DIRS report for ANL-DS0-NU-000001 REV 00 should be updated.

The resolution plan for TBV-9208 states the TBV “will be resolved when MDL-WIS-PA-000005 REV 00 AD 01 is approved and citations verified”. The document, MDL-WIS-PA-000005 REV 00 AD 01, has been qualified. The citations as revised by this ERD are corrected.

IV. Impact Evaluation

These changes do not affect any result or conclusion, nor do they impact any other technical product. Products evaluated for impact include *Postclosure Nuclear Safety Design Bases*. ANL-WIS-MD-000024 REV 01 [DIRS 177464], *Features, Events, and Processes for the Total System Performance Assessment: Analyses*. ANL-WIS-MD-000027 REV 00 [DIRS 183041], and *Engineered Barrier System Features, Events, and Processes*. ANL-WIS-PA-000002 REV 05 [DIRS 175041].

6F. Resolution of TBV-9242

I. Background Information Summary

The approved document, ANL-DS0-NU-000001 REV 00, cites file: “*Analysis for Water Flow through Stress Corrosion Cracking (SCC) Cracks in Waste Package and Drip Shield.xls*” of the unqualified DTN: SN0705WFLOWSCC.001 [DIRS 184848]. The file name was changed in the qualified DTN: SN0705WFLOWSCC.001.

II. Inputs and/or Software

N/A

III. Analysis and Results

The file name cited from DTN: SN0705WFLOWSCC.001 [DIRS 184848] in ANL-DS0-NU-000001 Rev 00 [DIRS 173869] was file: “*Analysis for Water Flow through Stress Corrosion Cracking (SCC) Cracks in Waste Package and Drip Shield.xls*”. The file name in the qualified DTN is given as “*Bounding calc for water flow through SCC cracks.xls*”. The cited information was not changed. The citations of the file name should be changed in ANL-DS0-NU-000001 REV 00. The sections from ANL-DS0-NU-000001 REV 00 affected are 6.3 and 6.4.2. The affected sections, i.e., Sections 6.3 and 6.4.2, of ANL-DS0-NU-000001 REV 00 should be updated.

The resolution plan for TBV-9242 states the TBV “will be resolved when SN0705WFLOWSCC.001 is qualified and citations verified”. DTN: SN0705WFLOWSCC.001 is qualified and the citations in ANL-DS0-NU-000001 REV 00 as revised by this ERD are corrected.

IV. Impact Evaluation

These changes do not affect any result or conclusion, nor do they impact any other technical product. Products evaluated for impact include *Postclosure Nuclear Safety Design Bases*. ANL-WIS-MD-000024 REV 01 [DIRS 177464], *Features, Events, and Processes for the Total System Performance Assessment: Analyses*. ANL-WIS-MD-000027 REV 00 [DIRS 183041], and *Engineered Barrier System Features, Events, and Processes*. ANL-WIS-PA-000002 REV 05 [DIRS 175041].

6G. Typographical Errors and Clarification

I. Background Information Summary

The approved document, ANL-DS0-NU-000001 REV 00, cites an incorrect internal table number on page 6-26. The approved document, ANL-DS0-NU-000001 REV 00, incorrectly displays an equation evaluated in the output DTN: MO0705CRITPROB.000, file "*Prob Calc.xls*" [DIRS 184958]. These typographical errors were observed during TBV resolution verifications.

The conditions necessary for a configuration to have potential for criticality as given in the second paragraph of Section 6.2 are correct but require additional clarification.

II. Inputs and/or Software

N/A

III. Analysis and Results

The second citation of Table 6.4-6 in the first sentence in the last paragraph on page 6-26 should be changed to cite Table 4.1-6. The equation, $(0.091 \times (0.0 + 0.147) + 0.0044 \times (0.147 + 0.412)) \times 0.5 = 7.9 \times 10^{-3}$, in Section 6.4.2.1 of ANL-DS0-NU-000001 REV 00 [DIRS 173869] is missing a right closure parenthesis in the second equation in paragraph 3, page 6-27. The equation should read $(0.091 \times (0.0 + 0.147) + 0.0044 \times (0.147 + 0.412)) \times 0.5 = 7.9 \times 10^{-3}$. The affected section, i.e., Section 6.4.2.1, should be updated.

The second paragraph of Section 6.2 should be revised to read in part: "Therefore, for a internal waste package configuration to have potential for criticality, all of the following conditions must occur: (1) sufficient mechanical or corrosive damage to the waste package OCB to cause a breach, (2) presence of a moderator (i.e., water), and (3) separation of fissionable material from the neutron absorber material or an absorber material selection error during the canister fabrication process. A fourth condition is also necessary for an external configuration, i.e., the accumulation or presence of a critical mass of fissionable material. The probability of developing a configuration with criticality potential is insignificant unless all necessary conditions occur, and then..."

There are no corrections to the DIRS report for these changes.

IV. Impact Evaluation

These changes do not affect any result or conclusion, nor do they impact any other technical product since the values are correct.

6H. Cancellation of TBV-9195

I. Background Information Summary

In the approved document, ANL-DS0-NU-000001 REV 00, the document, SNL 2007 [DIRS 183927], was cited in Section 4.1.15 as the source for the use of a distributed gadolinium neutron absorber in addition to the use of plate-type absorbers for reactivity control in FFTF canisters. The document, SNL 2007 [DIRS 183927], is in draft form requiring a TBV assignment pending final approval. The schedule for completing this document has not been firmly established, thus other sources are being referenced instead of those from SNL 2007 [DIRS 183927].

II. Inputs and/or Software

Citations of input from the draft version *Criticality Analyses for FFTF Fuel with Advanced Neutron Absorber Material* (SNL 2007 [DIRS 183927]) should be replaced by citations from *Packaging Strategies for Criticality Safety for "Other" DOE Fuels in a Repository* (DOE 2004 [DIRS 170071]) and *Criticality Calculation for the Most Reactive Degraded Configurations of the FFTF SNF Codisposal WP Containing an Intact Ident-69 Container* (BSC 2002 DIRS 164418).

III. Analysis and Results

In Section 4.1.15 of the approved document, ANL-DS0-NU-000001 REV 00, SNL 2007 [DIRS 183927] was cited as one source for descriptions of representative analysis cases for the degradation and reconfiguration of the internal structures and SNF waste forms (in particular, FFTF SNF waste forms) in a waste package. SNL 2007 [DIRS 183927] was also cited in Section 4.1.15 as indicating the necessity of having a distributed neutron absorber in the disposal canister for FFTF SNF that would allow the probability of an absorber misload for the FFTF waste form to be considered as insignificant. The approved document should be revised to cite DOE 2004 ([DIRS 170071], Summary and Section 4.3) and BSC 2002 (DIRS 164418), Section 6.2.3) in Section 4.1.15 of SNL 2008 [DIRS 173869] as the sources for the use and analysis of a distributed neutron absorber in FFTF SNF canisters in place of SNL 2007 [DIRS 183927].

The corrected DIRS report per SCI-PRO-004 is attached to this document and the DIRS report for ANL-DS0-NU-000001 REV 00 should be updated.

The resolution plan for TBV-9195 states the TBV “will be resolved when ANL-DSH-NU-000001 REV 00 is approved and citations verified”. ANL-DSH-NU-000001 REV 00 is being removed as an input source for ANL-DS0-NU-000001 REV 00 since the product approval plan has not been finalized. Thus, qualified alternate input sources are cited and TBV-9195 can be canceled.

IV. Impact Evaluation

These changes do not affect any result or conclusion, nor do they impact any other technical product as this change is for an input source and the output from the analysis is not impacted.