Model
Error Resolution Document

Complete only applicable items.

QA: QA

1. Document Number:	ANL-EBS-MD-000006	**2. Revision/Addendum:**	02/01	**3. ERD:**	ERD 01

4. Title: Hydrogen Induced Cracking of the Drip Shield

5. No. of Pages Attached: 2

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

Description of changes:

In regard to CR 12520, it was found that ANL-EBS-MD-000006 REV 02, Table 1, ANL-EBS-MD-000006 REV 02 ADD 01, Table 4-2[a] and output DTN: MO0705HYDROCRK.000, file: *TiTables.xls*, indicated that the listed value for maximum carbon content for Ti Grade 7 is 0.10 wt% with a source of ASTM B 265-02 [DIRS 162726], Table 2. ASTM B 265-02 [DIRS 162726], Table 2 lists 0.08 wt% rather than 0.10 wt% C as the maximum carbon content for Ti Grade 7. Similarly, ANL-EBS-MD-000006 REV 02, Table 1, incorrectly listed 0.10 wt% C rather than 0.08 wt% as the maximum carbon content for Ti Grade 11. To address these inconsistencies, notes to the reader are added that state:

1. "The maximum carbon content value (0.10 wt% C) listed in Tables 1 and 4-2[a] for Ti Grade 7 should be 0.08 wt%, consistent with the referenced ASTM specification, i.e., ASTM B 265-02 [DIRS 162726], Table 2."
2. "The maximum carbon content value (0.10 wt% C) listed in Table 1 for Ti Grade 11 should be 0.08 wt%, consistent with the referenced ASTM specification, i.e., ASTM B 265-02 [DIRS 162726], Table 2."
3. In addition, DTN: MO0705HYDROCRK.000, file: *TiTables.xls*, contained the titanium alloy composition table and a titanium alloy mechanical property table. The sheet: Tables in file: *TiTables.xls* was deleted from the DTN since it does not contain model output but rather only handbook-type data which is more appropriately referenced from the original sources. Consistent with this change, the table source note "Output DTN: MO0705HYDROCRK.000, file: *TiTables.xls*." is removed from beneath Tables 4-2[a] and 4-3[a].

In regard to CR 11919, an issue was identified relating to the Q-status of software used to calculate test solution target compositions listed Table I-1[a] of ANL-EBS-MD-000006 REV 02. To address CR 11919, this table is deleted and Table 3 of ANL-EBS-MD-000006 REV 02 is replaced with a new table which contains measured rather than "Target" test solution compositions. Specifically, the following changes are made:

1. Table 3 of ANL-EBS-MD-000006 REV 02 is replaced with a new Table 3 (shown below) containing the measured compositions (rather than the "Target" compositions) of the standardized solutions developed as relevant test environments. This addresses CR 11919.

7. CONCURRENCE			
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Table 3. Composition of Standard Test Media

Ion		SDW (mg/L)	SCW (mg/L)	SAW (mg/L)	SSW[a] (100°C) (mg/L)	SSW[a] (120°C) (mg/L)	BSW-11[b] (mg/L)
K^+	Minimum	3.58×10^1	1.35×10^3	3.25×10^3	---	---	5.89×10^4
	Average	3.69×10^1	3.48×10^3	3.51×10^3	1.42×10^5	1.70×10^5	6.04×10^4
	Maximum	3.94×10^1	4.96×10^3	3.86×10^3	---	---	6.19×10^4
Na^+	Minimum	3.30×10^2	3.36×10^4	3.92×10^4	---	---	9.45×10^4
	Average	4.10×10^2	3.99×10^4	4.22×10^4	4.87×10^5	5.84×10^5	9.75×10^4
	Maximum	4.68×10^2	4.36×10^4	4.36×10^4	---	---	1.01×10^5
Mg^{2+}	Minimum	0.00	0.00	4.99×10^1	---	---	0.00
	Average	6.62	5.68×10^{-2}	5.31×10^1	0	0	0.00
	Maximum	2.75×10^1	2.35×10^{-1}	5.72×10^1	---	---	0.00
Ca^{2+}	Minimum	0.00	1.11	4.95×10^1	---	---	6.40×10^{-1}
	Average	1.29×10^1	1.90	6.73×10^1	0	0	6.75×10^{-1}
	Maximum	4.51×10^1	2.74	9.65×10^1	---	---	7.09×10^{-1}
F^-	Minimum	0.00	1.03×10^3	0.00	---	---	3.80×10^3
	Average	9.39	1.26×10^3	2.68×10^2	0	0	3.83×10^3
	Maximum	3.02×10^1	1.48×10^3	7.75×10^2	---	---	3.85×10^3
Cl^-	Minimum	5.83×10^1	5.42×10^3	2.21×10^4	---	---	1.13×10^5
	Average	1.12×10^2	6.47×10^3	2.25×10^4	1.28×10^5	1.54×10^5	1.16×10^5
	Maximum	1.36×10^2	7.56×10^3	2.77×10^4	---	---	1.18×10^5
NO_3^-	Minimum	4.04×10^1	6.04×10^3	2.37×10^4	---	---	1.28×10^5
	Average	2.23×10^2	6.77×10^3	2.47×10^4	1.31×10^6	1.58×10^6	1.31×10^5
	Maximum	7.54×10^2	7.45×10^3	2.53×10^4	---	---	1.33×10^5
SO_4^{2-}	Minimum	1.55×10^2	1.21×10^4	4.35×10^4	---	---	1.17×10^4
	Average	2.32×10^2	1.52×10^4	6.00×10^4	0	0	1.22×10^4
	Maximum	2.96×10^2	1.92×10^4	6.95×10^4	---	---	1.28×10^4
HCO_3^-	Minimum	1.10×10^1	1.18×10^4	0.00	---	---	2.82×10^2
	Average	2.09×10^2	2.95×10^4	3.06×10^{-1}	0	0	3.87×10^2
	Maximum	5.39×10^2	4.28×10^4	9.51×10^{-1}	---	---	4.92×10^2
Si	Minimum	0.00	1.60×10^1	2.60×10^1	---	---	4.17×10^2
	Average	6.52	4.39×10^1	4.52×10^1	0	0	6.16×10^2
	Maximum	2.21×10^1	1.07×10^2	6.77×10^1	---	---	8.14×10^2
pH	Minimum	8.4	10.1	2.8	5.5	5.5	11.0
	Average	9.5	10.4	3.3	6.25	6.25	11.1
	Maximum	10.2	10.8	3.9	7	7	11.2

Source: DTN: LL081002312251.202 [DIRS 185793], file: *Revised_Vessel_Chem_02and04v4.xls*, worksheet: Range

Note: pH measured for the actual solution at room temperature (except SSW). BSW- basic saturated water

[a]SSW composition from TIP-CM-38, Rev. 0, Change Notice TIP-CM-38-0-1 [DIRS 185835], Table 1

[b]BSW solution composition can be slightly modified (mainly by adding sodium hydroxide) to cover a range of pH values from 11 to 13, yielding solutions referred to as BSW-11, -12, and -13.

2. In Section 1.3, page 1-7, 2nd paragraph, lines 9-12 currently read "The standardized solutions developed as relevant test environments are presented in Table 3. These solutions include simulated dilute waste (SDW), simulated concentrated water (SCW), and simulated acidic water (SAW) at 30°C, 60°C, and 90°C, as well as SSW at 100°C and 120°C.". This text should be replaced with the following: "The standardized solutions developed as relevant test environments are presented in Table 3. These solutions include simulated dilute water (SDW), simulated concentrated water (SCW), and simulated acidified water (SAW) at 60°C, and 90°C (used to establish the passive general corrosion rates listed as direct input in Table 4), as well as simulated saturated water (SSW) at 100°C and 120°C and basic saturated water (BSW)."
3. In Section 1.3.3, page 1-10, 5th paragraph, lines 1-2, currently read "BSW can have a pH between 11 and 13, and has a boiling point near 110°C (BSW-12 with a pH of 12 shown in Table 3)." This statement should read "BSW can have a pH between 11 and 13, and has a boiling point near 110°C (BSW-11 with a pH of ~11 shown in Table 3)"
4. In Section 1[a], page 1-2, the 4th paragraph, which currently reads "CR 7786, "Inconsistency between DTN and Table 3 in ANL-EBS-MD-000006 Rev

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02," is related to the chemical compositions of the Long-Term Corrosion Test Facility test solutions. This condition report is also addressed in this addendum by adding a corrected table, Table I-1[a], in the Appendix I[a] of this addendum." is deleted.

5. Appendix I[a] is deleted.
6. The following reference is added to Section 9.2[a]:
   185835 TIP-CM-38, Rev. 0, Change Notice TIP-CM-38-0-1. *Formulation of and Recipes for Simulated Saturated Water (SSW)*. Livermore, California: Lawrence Livermore National Laboratory. ACC: MOL.20010110.0444.
7. The following reference is added to Section 9.3[a]:
   185793 LL081002312251.202. Chemical Comparison of Corrosion Testing Solutions Used for Alloy C22 and Titanium at LLNL - Developed. Submittal date: 10/03/2008.
8. The following reference is deleted from Sections 9.3 and 9.3[a]
   171362 LL040803112251.117. Target Compositions of Aqueous Solutions Used for Corrosion Testing. Submittal date: 08/14/2004.

Additionally, a note to the reader is added: "SAW is an acronym for simulated **acidified** water not simulated **acidic** water."

Justification for Changes
In regard to CR 12520:

ANL-EBS-MD-000006 REV 02, Tables 4-2[a] and 4-3[a], are not model output but rather are handbook-type data which is more appropriately referenced from the original sources. On this basis, sheet: Tables of file: *TiTables.xls* in output DTN: MO0705HYDROCRK.000 was removed. Changing the maximum carbon content from 0.1 wt% to 0.08 wt% in ANL-EBS-MD-000006 REV 02, Table 1 and ANL-EBS-MD-000006 REV 02 ADD 01, Table 4-2[a] has no impact on the model conclusions or outputs. Further, these changes are not relevant to safety or waste isolation and have no impact on the Total System Performance Assessment.

In regard to CR 11919:

The chemical compositions of the test solutions were only used as background information. Therefore, replacement of Table 3 with the new Table 3 (above) has no impact on the model conclusions or outputs. Further, these changes are not relevant to safety or waste isolation and have no impact on the Total System Performance Assessment.

Analysis of Impacted Documents:

The changes listed above in response to CR 12520 and CR 11919 have no impact on the conclusions of or the outputs from ANL-EBS-MD-000006 REV 02 [DIRS 169847] and its associated Addendum [DIRS 181339]. Therefore, there is no impact on the following documents which cite ANL-EBS-MD-000006 REV 02 and ANL-EBS-MD 000006 REV 02 ADD 01: ANL-DSD-MD-000001 REV 01, ANL-WIS-MD-000027 REV 00, TDR-MGR-MD-000037 REV 02, ANL-DSD-MD-000001 REV 01, ANL-EBS-MD-000004 REV 02, and ANL-EBS-PA-000011 REV 00 (Under Development). None of the changes made in this ERD impact the Safety Analysis Report (SAR) because the SAR does not reference any of the text, tables, or figures changed.