	<h2 style="margin:0;">Model Error Resolution Document</h2> <p style="margin:0; font-size: small;">Complete only applicable items.</p>	QA: QA Page 1 of 3
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1. Document Number: ANL-EBS-MD-000033	2. Revision/Addendum: 06	3. ERD: 02
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4. Title: Engineered Barrier System: Physical and Chemical Environment	5. No. of Pages Attached: 2
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6. Description of and Justification for Change (Identify affected pages, applicable CRs and TBVs):  
 This ERD was created to partially resolve CR -11919.

According to CR 11919, unqualified software (Geochemists Workbench Version 2.0) was used to estimate the target compositions of standard test solutions in DTN: LL040803112251.117 [DIRS 171362]. The data from DTN: LL040803112251.117 [DIRS 171362] are reported in Table 6.13-6 as well as the reference Section 9.3. The source DTN: LL040803112251.117 [DIRS 171362] is being replaced by LL081002312251.202 [DIRS 185793] (SDW, SCW, SAW and BSW water composition) and TIP-CM-38, Rev. 0, Change Notice TIP-CM-38-0-1 [DIRS 185835], Table 1 (SSW water composition).

**Detailed description of changes due to CR 11919:**

**Section 9.3 (page 9-22):**

Replace  
 171362 LL040803112251.117. Target Compositions of Aqueous Solutions Used for Corrosion Testing. Submittal date: 08/14/2004.

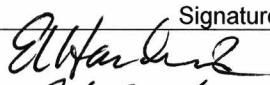
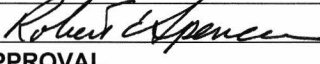
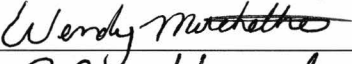

With  
 185793 LL081002312251.202. Chemical Comparison of Corrosion Testing Solutions Used for Alloy C22 and Titanium at LLNL - Developed. Submittal date: 10/03/2008

**Section 9.3:**

Add the following:  
 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.

**Table 6.13-6 (page 6-238):**

The entire Table 6.13-6 is being replaced by a new table containing the measured water compositions from LL081002312251.202 [DIRS 185793] (SDW, SCW, SAW and BSW) and target water composition from TIP-CM-38, Rev. 0, Change Notice TIP-CM-38-0-1 [DIRS 185835], Table 1 (SSW water composition) as follows:

7. CONCURRENCE			
	Printed Name	Signature	Date
7. Checker	Ernest Hardin		2/2/09
8. QCS/QA Reviewer	Robert Spencer		2/2/09
8. APPROVAL			
9. Originator	Wendy Mitcheltree		2/2/09
10. Responsible Manager	Palmer Vaughn		2/2/09

SCI-PRO-006.3-R2

Table 6.13-6: Test Solution Compositions

Ion		SDW (mg/L)	SCW (mg/L)	SAW (mg/L)	SSW <sup>a</sup> (100°C) (mg/L)	SSW <sup>a</sup> (120°C) (mg/L)	BSW-11 <sup>b</sup> (mg/L)
K <sup>+</sup>	Minimum	3.58 x 10 <sup>1</sup>	1.35 x 10 <sup>3</sup>	3.25 x 10 <sup>3</sup>	---	---	5.89 x 10 <sup>4</sup>
	Average	3.69 x 10 <sup>1</sup>	3.48 x 10 <sup>3</sup>	3.51 x 10 <sup>3</sup>	1.42 x 10 <sup>5</sup>	1.70 x 10 <sup>5</sup>	6.04 x 10 <sup>4</sup>
	Maximum	3.94 x 10 <sup>1</sup>	4.96 x 10 <sup>3</sup>	3.86 x 10 <sup>3</sup>	---	---	6.19 x 10 <sup>4</sup>
Na <sup>+</sup>	Minimum	3.30 x 10 <sup>2</sup>	3.36 x 10 <sup>4</sup>	3.92 x 10 <sup>4</sup>	---	---	9.45 x 10 <sup>4</sup>
	Average	4.10 x 10 <sup>2</sup>	3.99 x 10 <sup>4</sup>	4.22 x 10 <sup>4</sup>	4.87 x 10 <sup>5</sup>	5.84 x 10 <sup>5</sup>	9.75 x 10 <sup>4</sup>
	Maximum	4.68 x 10 <sup>2</sup>	4.36 x 10 <sup>4</sup>	4.36 x 10 <sup>4</sup>	---	---	1.01 x 10 <sup>5</sup>
Mg <sup>2+</sup>	Minimum	0.00	0.00	4.99 x 10 <sup>1</sup>	---	---	0.00
	Average	6.62	5.68 x 10 <sup>-2</sup>	5.31 x 10 <sup>1</sup>	0	0	0.00
	Maximum	2.75 x 10 <sup>1</sup>	2.35 x 10 <sup>-1</sup>	5.72 x 10 <sup>1</sup>	---	---	0.00
Ca <sup>2+</sup>	Minimum	0.00	1.11	4.95 x 10 <sup>1</sup>	---	---	6.40 x 10 <sup>-1</sup>
	Average	1.29 x 10 <sup>1</sup>	1.90	6.73 x 10 <sup>1</sup>	0	0	6.75 x 10 <sup>-1</sup>
	Maximum	4.51 x 10 <sup>1</sup>	2.74	9.65 x 10 <sup>1</sup>	---	---	7.09 x 10 <sup>-1</sup>
F <sup>-</sup>	Minimum	0.00	1.03 x 10 <sup>3</sup>	0.00	---	---	3.80 x 10 <sup>3</sup>
	Average	9.39	1.26 x 10 <sup>3</sup>	2.68 x 10 <sup>2</sup>	0	0	3.83 x 10 <sup>3</sup>
	Maximum	3.02 x 10 <sup>1</sup>	1.48 x 10 <sup>3</sup>	7.75 x 10 <sup>2</sup>	---	---	3.85 x 10 <sup>3</sup>
Cl <sup>-</sup>	Minimum	5.83 x 10 <sup>1</sup>	5.42 x 10 <sup>3</sup>	2.21 x 10 <sup>4</sup>	---	---	1.13 x 10 <sup>5</sup>
	Average	1.12 x 10 <sup>2</sup>	6.47 x 10 <sup>3</sup>	2.25 x 10 <sup>4</sup>	1.28 x 10 <sup>5</sup>	1.54 x 10 <sup>5</sup>	1.16 x 10 <sup>5</sup>
	Maximum	1.36 x 10 <sup>2</sup>	7.56 x 10 <sup>3</sup>	2.77 x 10 <sup>4</sup>	---	---	1.18 x 10 <sup>5</sup>
NO <sub>3</sub> <sup>-</sup>	Minimum	4.04 x 10 <sup>1</sup>	6.04 x 10 <sup>3</sup>	2.37 x 10 <sup>4</sup>	---	---	1.28 x 10 <sup>5</sup>
	Average	2.23 x 10 <sup>2</sup>	6.77 x 10 <sup>3</sup>	2.47 x 10 <sup>4</sup>	1.31 x 10 <sup>6</sup>	1.58 x 10 <sup>6</sup>	1.31 x 10 <sup>5</sup>
	Maximum	7.54 x 10 <sup>2</sup>	7.45 x 10 <sup>3</sup>	2.53 x 10 <sup>4</sup>	---	---	1.33 x 10 <sup>5</sup>
SO <sub>4</sub> <sup>2-</sup>	Minimum	1.55 x 10 <sup>2</sup>	1.21 x 10 <sup>4</sup>	4.35 x 10 <sup>4</sup>	---	---	1.17 x 10 <sup>4</sup>
	Average	2.32 x 10 <sup>2</sup>	1.52 x 10 <sup>4</sup>	6.00 x 10 <sup>4</sup>	0	0	1.22 x 10 <sup>4</sup>
	Maximum	2.96 x 10 <sup>2</sup>	1.92 x 10 <sup>4</sup>	6.95 x 10 <sup>4</sup>	---	---	1.28 x 10 <sup>4</sup>
HCO <sub>3</sub> <sup>-</sup>	Minimum	1.10 x 10 <sup>1</sup>	1.18 x 10 <sup>4</sup>	0.00	---	---	2.82 x 10 <sup>2</sup>
	Average	2.09 x 10 <sup>2</sup>	2.95 x 10 <sup>4</sup>	3.06 x 10 <sup>-1</sup>	0	0	3.87 x 10 <sup>2</sup>
	Maximum	5.39 x 10 <sup>2</sup>	4.28 x 10 <sup>4</sup>	9.51 x 10 <sup>-1</sup>	---	---	4.92 x 10 <sup>2</sup>
Si	Minimum	0.00	1.60 x 10 <sup>1</sup>	2.60 x 10 <sup>1</sup>	---	---	4.17 x 10 <sup>2</sup>
	Average	6.52	4.39 x 10 <sup>1</sup>	4.52 x 10 <sup>1</sup>	0	0	6.16 x 10 <sup>2</sup>
	Maximum	2.21 x 10 <sup>1</sup>	1.07 x 10 <sup>2</sup>	6.77 x 10 <sup>1</sup>	---	---	8.14 x 10 <sup>2</sup>
pH	Minimum	8.4	10.1	2.8	5.5	5.5	11.0
	Average	9.5	10.4	3.3	6.25 <sup>c</sup>	6.25 <sup>c</sup>	11.1
	Maximum	10.2	10.8	3.9	7	7	11.2

Source: SDW, SCW, SAW, and BSW-11 data are from DTN: LL081002312251.202 [DIRS 185793], file: Revised\_Vessel\_Chem\_02and04v4.xls, worksheet: Range. The pH reported for these solutions was measured at room temperature. Concentration data are reported to 3 significant figures which is comparable to the analytical precision for major species; actual precision for the less abundant species may be less because of dilutions used in the analyses.

NOTES: <sup>a</sup>SSW composition is the target from TIP-CM-38, Rev. 0, Change Notice TIP-CM-38-0-1 [DIRS 185835], Table 1.

<sup>b</sup>Basic saturated water (BSW) solution composition was modified (mainly by adding sodium hydroxide) to produce pH values from 11 to 13, yielding solutions referred to as BSW-11, -12, and -13.

<sup>c</sup>The average value presented for the pH of the SSW solution is the median value of the estimated range of pH given (5.5-7) in TIP-CM-38, Rev. 0, Change Notice TIP-CM-38-0-1 [DIRS 185835], Table 1.

**Analysis of Impacted Documents:**

Changing the indirect input source DTN from DTN: LL040803112251.117 [DIRS 171362] to DTN: LL081002312251.202 [DIRS 185793], in ANL-EBS-MD-000033 REV 06, Table 6.13-6 has no impact on the model conclusions or outputs.

Further, these changes have no impact on the Total System Performance Assessment. Also, none of the controlled or under-development documents which cite ANL-EBS-MD-000033 REV 06 use the corrected information presented above in Table 6.13-6. Therefore, there is no impact on the following controlled or under-development documents which cite ANL-EBS-MD-000033 REV 06. The following is a list of documents citing ANL-EBS-MD-000033 REV 06 as a source:

**Controlled Documents:**

ANL-EBS-MD-000033 REV06 ERD02

ANL-EBS-GS-000001 Rev. 02, ANL-EBS-MD-000003 Rev. 03, ANL-EBS-MD-000004 Rev. 02, Add 01, ANL-EBS-MD-000037 Rev. 04, Add 01, ANL-EBS-MD-000038 Rev. 01, ANL-EBS-MD-000049 Rev. 03, Add 02, ANL-EBS-PA-000011 Rev. 00, ANL-NBS-HS-000047 Rev. 01, ANL-NBS-HS-000057 Rev. 00, ANL-WIS-MD-000010 Rev. 06, ANL-WIS-MD-000024 Rev. 01, ANL-WIS-MD-000027 Rev. 00, ACN 01, ANL-WIS-MD-000027 Rev. 00, ANL-WIS-PA-000001 Rev. 03, MDL-EBS-MD-000001 Rev. 00, Add 01, MDL-EBS-PA-000004 Rev. 03, MDL-NBS-HS-000001 Rev. 05, MDL-WIS-PA-000005 Rev. 00, TDR-PCS-SE-000001 Rev. 05, Add 01 and TDR-WIS-PA-000014 Rev. 00.

**Under Development Documents:**

ANL-EBS-PA-000012 Rev. 00 and DOE/EIS-0250F-S1 MiscId 18