



## Model Error Resolution Document

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*Complete only applicable items.*

### INITIATION

1. Originator: Gerald M. Gordon and Kevin G. Mon	2. Date: 4/1/2008	3. ERD No. ANL-EBS-MD-000005 ERD02
4. Document Identifier: ANL-EBS-MD-000005 REV 04	5. Document Title: Stress Corrosion Cracking of Waste Package Outer Barrier and Drip Shield Materials	

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

#### Description of Changes:

In regard to CR 11930:

- In Section 6.5.3.3.1 (p. 6-56), Figure 6-13 should be replaced with Figure 6-12 so that the sentence that reads, "The directions of x, y, and z used in the finite element model are shown in Figure 6-13." reads "The directions of x, y, and z used in the finite element model are shown in Figure 6-12."

In addition, incorrect figure and table cross-references and typographic errors were identified as indicated below:

- In Section 6.5.3.3.1 (p. 6-54), Figure 6-16 should be replaced with Figure 6-17 and the word "ration" replaced with "ratio" so that the sentence that reads "The second is an elliptical surface crack in an infinite plate with crack aspect ration of  $a/l = 0.1$  as shown in Figure 6-16 from "Risk-Informed Requirements for Class 1, 2, and 3 Piping, Method B, Section XI, Division 1" in 1995 Code Cases, Nuclear Components (ASME 1995 [DIRS 169771])." reads "The second is an elliptical surface crack in an infinite plate with crack aspect ratio of  $a/l = 0.1$  as shown in Figure 6-17 from "Risk-Informed Requirements for Class 1, 2, and 3 Piping, Method B, Section XI, Division 1" in 1995 Code Cases, Nuclear Components (ASME 1995 [DIRS 169771])."
- In Section 6.5.5.1 (p. 6-82), Figure 6-48 should be replaced with Figure 6-37 so that the sentence that reads "In other words, the weld-induced residual stress in the 25-mm outer lid of the CRM-21-PWR design is reduced from tensile stress to 40 ksi compressive stress for a depth of 0.06 in (1.5 mm) at the outside surface as shown in Figure 6-48." reads "In other words, the weld-induced residual stress in the 25-mm outer lid of the CRM-21-PWR design is reduced from tensile stress to 40 ksi compressive stress for a depth of 0.06 in (1.5 mm) at the outside surface as shown in Figure 6-37."
- In Section 8.1.5 (p. 8-10), Figure 6-81 is mentioned twice in the third paragraph and should be replaced with Table 6-36 in both places so that the first three sentences of the third paragraph that read, "A comparison of  $K_{Ic}$ ,  $K_{ISLC}$ , and  $K_{ISCC}$  values for the range of relevant titanium alloys is given in Figure 6-81. Also included are more limited literature and YMP data for specific alloys and for other environments. These results are nominal values and will vary with alloy composition, metallurgical condition, and product form and thickness. Although it is indicated in Figure 6-81 that  $K_{ISCC}$  for Titanium Grade 7 is less than  $30 \text{ MPa}\sqrt{\text{m}}$ , it is not yet clear whether the measured crack growth rates were due to creep or SCC." should be changed to read "A comparison of  $K_{Ic}$ ,  $K_{ISLC}$ , and  $K_{ISCC}$  values for the range of relevant titanium alloys is given in Table 6-36. Also included are more limited literature and YMP data for specific alloys and for other environments. These results are nominal values and will vary with alloy composition, metallurgical condition, and product form and thickness. Although it is indicated in Table 6-36 that  $K_{ISCC}$  for Titanium Grade 7 is less than  $30 \text{ MPa}\sqrt{\text{m}}$ , it is not yet clear whether the measured crack growth rates were due to creep or SCC."
- In Section 6.2.1.2.2 (p. 6-10), second paragraph, Table 6-2 should be replaced with (DTN: MO0707SCCIGMER.000 [DIRS 182202], Section 4.0) so that the sentence that reads "The specimens tested and conditions covered are summarized in Table 6-2." reads "The specimens tested and conditions covered are summarized in (DTN: MO0707SCCIGMER.000 [DIRS 182202], Section 4.0)."

### CONCURRENCE

	Printed Name	Signature	Date
7. Checker	Gopal C. De		04/03/2008
8. QCS/QA Reviewer	Brian Mitcheltree		4/3/08

### APPROVAL

9. Originator	Gerald M. Gordon Kevin G. Mon		04/03/08 04/03/08
10. Responsible Manager	Neil Brown Paul R. Dixon <i>NRB</i>		4-3-08



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6. In Section 6.4.5.3 (p. 6-42), second paragraph, the material constant,  $n'$ , should be replaced with,  $n$ , so that the sentence that reads "Values for  $\bar{A}$  and  $\bar{n}$  can be determined from Equations 15, 16, and 17 for a given value of  $n'$ " reads "Values for  $\bar{A}$  and  $\bar{n}$  can be determined from Equations 15, 16, and 17 for a given value of  $n$ ."
7. In Section 6.2.1.1 (p. 6-6), second paragraph, item 5 that reads "Cold-worked condition (20% cold-worked) with and without thermal aging at 700°C for 175 hours." should read "Cold-worked condition (20% cold-worked) with and without LRO thermal aging."
8. In Section 6.8.4.2.3 (p. 6-168), first paragraph, the last sentence that currently reads, "These  $n$  values are somewhat lower but reasonably consistent with literature values varying from 1.05 to 1.14 obtained on beta titanium alloys exposed to various chloride brines (Kolman et al. 1998 [DIRS 177264], Section 6.8.4.1)." should read "Literature  $n$  values obtained for titanium alloys are somewhat lower than the mean value for Alloy 22 (1.165); e.g.,  $n$  values varying from 1.05 to 1.14 were obtained on beta titanium alloys exposed to various chloride brines (Kolman et al. 1998 [DIRS 177264], Section 6.8.4.1)."
9. In Section 6.5.6.4 (p. 6-105), the last sentence that reads, "The stress intensity factor profiles for the as-welded waste package outer closure lid plasticity-burnished waste package outer closure lid calculated using Equations 28 and 29 and plotted with the angle,  $\theta$ , set at 45° and 135°, are presented in Figure 8-5 of output DTN: MO0702PASTRESS.002." should read "The stress intensity factor profiles for the as-welded waste package outer closure lid and plasticity-burnished waste package outer closure lid calculated using Equations 28 and 29 for intermediate angle,  $\theta$ , set at 45° and 135°, are presented, respectively, in DTN: MO0702PASTRESS.002, file *Figure 6-51 (Figure 8-2) Through Figure 6-58 (Figure 8-9).xls*, Sheets "Angular S As-Welded" and "Angular S CPB."
10. In Figure 6-84 (p. 6-188), the point at an Applied Stress Ratio of 111 and a Secondary Creep Rate of  $3.90 \times 10^{-4}$  is represented as a red diamond. This point should be represented as a red open square. All instances of "h-1" in this figure should be "h<sup>-1</sup>"
11. In Figure 6-86 (p. 6-190), the symbol in the legend for "105C Rate, h-1, Ti Grade 7" is a filled blue square. This symbol should be a filled blue star. All instances of "h-1" in this figure should be "h<sup>-1</sup>"

### Justification for Change:

In regard to CR 11930:

On page 6-56 of ANL-EBS-MD-000005 REV 04, a cross-reference to Figure 6-13 is made. The correct figure number for the cross-reference is Figure 6-12. This correction does not affect the technical product output of ANL-EBS-MD-000005 REV 04 and is not relevant to safety or waste isolation and does not have any impact on the results of the Safety Analysis Report or the Total System Performance Assessment.

In regard to the additional incorrect figure and table cross-references and typographic errors identified in items 2 through 11: These corrections do not affect the technical product output of ANL-EBS-MD-000005 REV 04 and are not relevant to safety or waste isolation and do not have any impact on the results of the Safety Analysis Report or the Total System Performance Assessment.

### Analysis of Impacted Documents:

The changes listed in items 1 through 11 have no impact on the conclusions of or the outputs from ANL-EBS-MD-000005 REV 04. Therefore, there is no impact on the following documents that cite ANL-EBS-MD-000005 REV 04: ANL-DS0-NU-000001 Rev. 00; ANL-EBS-MD-000076 Rev. 00, ACN 01; ANL-WIS-MD-000024 Rev. 01; ANL-WIS-PA-000001 Rev. 03; CAL-DN0-NU-000002 Rev. 00C; MDL-WIS-PA-000003 Rev. 03; MDL-WIS-PA-000005 Rev. 00, MiscId 01; MDL-WIS-PA-000005 Rev. 00, MiscId 02; MDL-WIS-PA-000005 Rev. 00, MiscId 03; TDR-MGR-MD-000056 Rev. 00; TDR-PCS-SE-000001 Rev. 05, Addendum 01; TDR-WIS-PA-000014 Rev. 00; ANL-WIS-MD-000027 Rev. 00; LASAR-2.03.06; MDL-WIS-PA-000005 Rev. 00, Addendum 01.