Model
Error Resolution Document

Complete only applicable items.

QA: QA

1. Document Number:	2. Revision/Addendum:	3. ERD:
MDL-WIS-AC-000001	00	03

4. Title:	5. No. of Pages Attached:
Mechanical Assessment Of Degraded Waste Packages And Drip Shields Subject To Vibratory Ground Motion	4

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

The following evaluations/changes/corrections are posted to correct the conditions identified in CR-13540. A justification for no impact to the conclusions of MDL-WIS-AC-000001 REV 00 is included.

1) On page A-2 in Table A-2 two headings are incorrect and should be changed:
93/200 should be changed to 204/400,
204/400 should be changed to 232/450

	Printed Name	Signature	Date
7. Checker	John W. Kelly	John W. Kelly	9/10/09
8. QCS/QA Reviewer	Sounia K. Darnell	Sounia K. Darnell	09/10/2009
9. Originator	Leslie E. Safley	Leslie E Safley	9/10/2009
10. Responsible Manager	Cliff Howard	Cliff Howard	9/10/09

1. DESCRIPTION OF ISSUE/CONDITION

CR 13540 identified the following condition:

In *Mechanical Assessment of Degraded Waste Packages and Drip Shields Subject to Vibratory Ground Motion* (MDL-WIS-AC-000001 REV 00), on page A-2, an error was identified in two headings of Table A-2. The data in the body of Table A-2 are correct and the correct values were used in the calculations for MDL-WIS-AC-000001.

2. DESCRIPTION OF CHANGE

Make the following changes to headings in Table A-2 of *Mechanical Assessment of Degraded Waste Packages and Drip Shields Subject to Vibratory Ground Motion*:

1) 93/200 should be changed to 204/400
2) 204/400 should be changed to 232/450.

Note: Since no values in Table A-2 are changed, there is no change to the DIRS report for *Mechanical Assessment of Degraded Waste Packages and Drip Shields Subject to Vibratory Ground Motion* (MDL-WIS-AC-000001 REV 00), and no impact on computational results or conclusions of the report.

3. DESCRIPTION OF SOFTWARE, INPUTS, AND OUTPUTS

No software was used for the corrections in this error resolution document, and no inputs were changed. Also, there is no correction to any output DTNs.

4. LIST OF RELATED PAGE CHANGES, CR NUMBERS AND TBV NUMBERS

CR number 13540 and related page changes in *Mechanical Assessment of Degraded Waste Packages and Drip Shields Subject to Vibratory Ground Motion* include the following:

Appendix A, page A-2, Table A-2.

5. IMPACT/RESULTS AND CONCLUSION:

Table A-2 identifies the mechanical properties of Titanium Grade 24 (SB-265 R56405) used in the Universal Distinct Element Code (UDEC) calculations for *Mechanical Assessment of Degraded Waste Packages and Drip Shields Subject to Vibratory Ground Motion* (MDL-WIS-AC-000001 REV 00). Correction of the table headers (93/200 should be changed to 204/400 and 204/400 should be changed to 232/450) does not affect the data in the body of the table. The data have been verified by subject matter experts familiar with the data sources and calculations. The rounded values at room temperature and the other temperatures used in the interpolation are calculated as averages between the minimum and maximum provided in the sources. In particular, the material properties of Titanium Grade 24 at 60/140 are correct, and

the actual values, not the rounded values, are used in the UDEC calculations for MDL-WIS-AC-000001.

Table A-2. Mechanical Properties of Titanium Grade 24 (SB-265 R56405) Used in the UDEC Calculations

Properties	Temperatures (°C/°F)[a]				Source
	21/70	60/140	204/400	232/450	
Density ρ (kg/m^3)[b]	4,430	–	–	–	ASM 1990 [DIRS 141615] p. 620
Poisson's ratio ν[b]	0.34	–	–	–	ASM 1990 [DIRS 141615] p. 621
Average Young's modulus E (MPa)	114,500	112,377 (interpolated)	–	103,000	TIMET 2000 [DIRS 160688], Table 2
Yield strength σ_y (MPa)	910	862 (interpolated)	683	–	TIMET 1993 [DIRS 157726], p. 11
Ultimate engineering elongation e_u	0.180	0.178 (interpolated)	0.17	–	TIMET 1993 [DIRS 157726], p. 11
Ultimate true elongation ε_u[c]	0.166	0.164	0.16	–	$\varepsilon_u = \ln(1 + e_u)$ Dieter 1976 [DIRS 118647]
Engineering tensile strength s_u (MPa)	1,000	951 (interpolated)	772	–	TIMET 1993 [DIRS 157726], p. 11
True tensile strength σ_u (MPa)[c]	1,180	1,121	903	–	$\sigma_u = s_u(1+ e_u)$ Dieter 1976 [DIRS 118647]
Tangent modulus E_t (MPa)[c]	1,714	1,660	–	–	$E_t = \frac{\sigma_u - \sigma_y}{\varepsilon_u - \sigma_y / E}$

[a] Temperature ranges reported by Timet differ slightly. Standard ASME temperature ranges used.
[b] Density and Poisson's ratio values are based on alpha-beta alloy, 6Al-4V.
[c] Values are not interpolated but are calculated using the formulas in "Source" column and available properties at 60°C.

NOTE: Interpolation conducted between two closest available temperatures. When range is provided in the source, the average value is used. Dieter (1976) is the source of the equations rather than a data source. The relationships between the true stress and strain definitions and the engineering stress and strain definitions can be readily derived based on consistency of volume and strain homogeneity during plastic deformation (described in Dieter 1976 [DIRS 118647], Chapter 9).

Correction of the Table headers does not impact the conclusions of *Mechanical Assessment of Degraded Waste Packages and Drip Shields Subject to Vibratory Ground Motion* (MDL-WIS-AC-000001 REV 00) because no data has been changed. The model report conclusions and output data were developed from analysis of the appropriate values and were not changed by this ERD.

The DIRS database was queried and the following documents were identified as citing *Mechanical Assessment of Degraded Waste Packages and Drip Shields Subject to Vibratory Ground Motion* (MDL-WIS-AC-000001 REV 00). These documents were evaluated to determine if Table A-2 was cited.

000-PSA-MGR0-01100-000-00B
Seismic Event Sequence Quantification and Categorization Analysis

000-PSA-MGR0-02100-000-00A
Seismic and Structural Container Analyses for the PCSA

ANL-DS0-NU-000001 Rev. 00, ACN 01
Screening Analysis of Criticality Features, Events, and Processes for License Application

ANL-DS0-NU-000001 Rev. 00
Screening Analysis of Criticality Features, Events, and Processes for License Application

ANL-EBS-MD-000006 Rev. 02, Addendum 01
Hydrogen-Induced Cracking of the Drip Shield

ANL-EBS-PA-000011 Rev. 00
Postclosure Design Input Parameters for Engineered Barrier System In-Drift Configuration

ANL-EBS-PA-000012 Rev. 00
Postclosure Design Input Parameters for Subsurface Facilities

ANL-EBS-PA-000013 Rev. 00
Postclosure Design Input Parameters for Waste Package Outer Barrier and Inner Vessels

ANL-EBS-PA-000014 Rev. 00
Postclosure Design Input Parameters for Waste Forms and Internals

ANL-WIS-MD-000024 Rev. 01
Postclosure Nuclear Safety Design Base

ANL-WIS-MD-000027 Rev. 00
Features, Events, and Processes for the Total System Performance Assessment: Analyses

MDL-MGR-GS-000007 Rev. 000
Supplemental Earthquake Ground Motion Input for a Geologic Repository at Yucca Mountain, NV

MDL-WIS-PA-000003 Rev. 03
Seismic Consequence Abstraction

MDL-WIS-PA-000005 Rev. 00, MiscId 01
Total System Performance Assessment Model/Analysis for the License Application - Volume I

MDL-WIS-PA-000005 Rev. 00, MiscId 02
Total System Performance Assessment Model/Analysis for the License Application - Volume II

MDL-WIS-PA-000005 Rev. 00, MiscId 03
Total System Performance Assessment Model/Analysis for the License Application - Volume III

TDR-MGR-GS-000004 Rev. 00
Data Qualification of Selected Data Tracking Numbers With Incorrect Acquisition/Development Methods

LASAR-1.03.04 LA SAFETY ANALYSIS REPORT SECTION 1.3.4

LASAR-2.03.04, LA SAFETY ANALYSIS REPORT SECTION 2.2

LASAR-2.02 LA SAFETY ANALYSIS REPORT SECTION 2.3.4

LASAR-2.04 LA SAFETY ANALYSIS REPORT SECTION 2.4

The evaluation concluded that none of these documents has cited the data in Table A-2. The listed documents cited text or figures within MDL-WIS-AC-000001 REV 00 which were not changed by the correction in this ERD. This was a clerical error in Table A-2 and the corrected table completes the needed clarification.

Also, since no impacts resulted to the conclusions or output of *Mechanical Assessment of Degraded Waste Packages and Drip Shields Subject to Vibratory Ground Motion* (MDL-WIS-AC-000001 REV 00) model report or the documents that cite this report, the changes addressed by this ERD will have no impact on any downstream products, the TSPA-LA, the SAR, or nuclear safety.