

**OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
ANALYSIS/MODEL COVER SHEET**
Complete Only Applicable Items

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2. <input checked="" type="checkbox"/> Analysis <input type="checkbox"/> Engineering <input type="checkbox"/> Performance Assessment <input checked="" type="checkbox"/> Scientific	3. <input checked="" type="checkbox"/> Model <input checked="" type="checkbox"/> Conceptual Model Documentation <input checked="" type="checkbox"/> Model Documentation <input checked="" type="checkbox"/> Model Validation Documentation
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4. Title:
CSNF Waste Form Degradation: Summary Abstraction

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	Printed Name	Signature	Date
8. Originator	Steven A. Steward	<i>Steven A. Steward</i>	Jan. 12, 2000
9. Checker	James C. Cunnane	<i>James C. Cunnane</i>	1/12/00
10. Lead/Supervisor	Christine Stockman	<i>Christine Stockman</i>	1/12/2000
11. Responsible Manager	David Stahl	<i>David Stahl</i>	1/12/00

12. Remarks

Table 18. Coefficients and Statistics for the Alkaline Spent-Fuel Dissolution Model in Table 17 with Temperature as the Only Variable

Term	Coefficient	Standard Error	T-value	Significance
1	3.824295	0.827990		
IT	-1046.960206	263.492557	-3.97	0.0002

NOTES: No. cases = 60
R-sq. = 0.2140
RMS Error = 0.465
Resid. DF = 58
R-sq-adj. = 0.2004

An alternate approach is one in which the unirradiated UO₂ and spent-fuel dissolution data are modeled separately not including cross-terms. Those fits are included in Tables 19 and 20. The UO₂ model has an R-squared of 0.8. The spent-fuel model in Table 20 has an R² of only 0.6.

Table 19. Coefficients and Statistics for the Alkaline UO₂ Dissolution Model

Term	Coefficient	Standard Error	T-value	Significance
1	5.612993	1.345481		
IT	-1821.008694	353.161180	-5.16	0.0001
PCO ₃	-0.303113	0.089489	-3.39	0.0035
PO ₂	-0.475644	0.093283	-5.10	0.0001
PH	0.241005	0.089458	2.69	0.0154

NOTES: No. cases = 22
R-sq. = 0.8089
RMS Error = 0.3541
Resid. DF = 17
R-sq-adj. = 0.7639

Table 20. Coefficients and Statistics for the Alkaline Spent-Fuel-Only Dissolution Model

Term	Coefficient	Standard Error	T-value	Significance
1	4.444920	0.878684		
IT	-702.182559	168.339695	-4.17	0.0002
PCO ₃	-0.044638	0.043371	-1.03	0.3111
PO ₂	-0.222600	0.049589	-4.49	0.0001
PH	-0.136076	0.047954	-2.84	0.0078
LBU	-0.096252	0.302149	-0.32	0.7521

NOTES: No. cases = 38
R-sq. = 0.6067
RMS Error = 0.2393
Resid. DF = 32
R-sq-adj. = 0.5452

Shoosmith (1999, Sec. 5.8) states that the corrosion of spent fuel is inherently the same process as that of unirradiated UO₂. This viewpoint depends on the chemical environment as well as what is considered to be significantly different. Table 1 shows dissolution rate differences