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Subject: Th(IV), Np(V), and Am(III) Baseline Solubilities for the 2026 WIPP Compliance Recertification Application Performance Assessment Interim-State Analysis (CRA-2026 IS)

Table 1 of this memorandum provides the parameter data entry information for the baseline solubilities of Th(IV), Np(V), and Am(III) for the WIPP PA Parameter Database for the CRA-2026 IS. These baseline solubilities are based on: (1) the concentrations of the organic ligands acetate, citrate, ethylenediaminetetraacetate (EDTA), and oxalate in two Waste Isolation Pilot Plant (WIPP) standard brines as a function of the volumes of these brines in the repository (Domski, 2025a); and (2) the Th(IV), Np(V), and Am(III) baseline solubilities predicted by EQ3/6 for these organic ligand concentrations (Domski, 2025b, Tables 6 and 7). Table 1 provides the solubilities of An(III), An(IV), and An(V) in Salado (GWB), and Castile (ERDA-6) brines.

Table 1. Parameter Data Entry for the Baseline Actinide Solubilities for the CRA-2026 IS (Domski, 2025b, Tables 6 and 7).

Parameter Description	Material	Property	Value	Units
Oxidation state III model, solubility in the minimum volume of Salado brine	SOLMOD3	SOLSOH	1.45E-05	M (mol/L)
Oxidation state III model, solubility in 2 × the minimum volume of Salado brine	SOLMOD3	SOLSOH2	7.88E-06	M

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Table 1. Parameter Data Entry for the Baseline Actinide Solubilities for the CRA-2026 IS (Domski, 2025b, Tables 6 and 7) (continued).

Parameter Description	Material	Property	Value	Units
Oxidation state III model, solubility in 3 × the minimum volume of Salado brine	SOLMOD3	SOLSOH3	5.45E-06	M (mol/L)
Oxidation state III model, solubility in 4 × the minimum volume of Salado brine	SOLMOD3	SOLSOH4	4.20E-06	M
Oxidation state III model, solubility in 5 × the minimum volume of Salado brine	SOLMOD3	SOLSOH5	3.43E-06	M
Oxidation state III model, solubility in the minimum volume of Castile brine	SOLMOD3	SOLCOH	1.44E-05	M
Oxidation state III model, solubility in 2 × the minimum volume of Castile brine	SOLMOD3	SOLCOH2	8.02E-06	M
Oxidation state III model, solubility in 3 × the minimum volume of Castile brine	SOLMOD3	SOLCOH3	5.59E-06	M
Oxidation state III model, solubility in 4 × the minimum volume of Castile brine	SOLMOD3	SOLCOH4	4.32E-06	M
Oxidation state III model, solubility in 5 × the minimum volume of Castile brine	SOLMOD3	SOLCOH5	3.54E-06	M
Oxidation state IV model, solubility in the minimum volume of Salado brine	SOLMOD4	SOLSOH	5.34E-08	M

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Table 1. Parameter Data Entry for the Baseline Actinide Solubilities for the CRA-2026 IS (Domski, 2025b, Tables 6 and 7) (continued).

Parameter Description	Material	Property	Value	Units
Oxidation state IV model, solubility in 2 × the minimum volume of Salado brine	SOLMOD4	SOLSOH2	5.34E-08	M (mol/L)
Oxidation state IV model, solubility in 3 × the minimum volume of Salado brine	SOLMOD4	SOLSOH3	5.33E-08	M
Oxidation state IV model, solubility in 4 × the minimum volume of Salado brine	SOLMOD4	SOLSOH4	5.34E-08	M
Oxidation state IV model, solubility in 5 × the minimum volume of Salado brine	SOLMOD4	SOLSOH5	5.34E-08	M
Oxidation state IV model, solubility in the minimum volume of Castile brine	SOLMOD4	SOLCOH	5.63E-08	M
Oxidation state IV model, solubility in 2 × the minimum volume of Castile brine	SOLMOD4	SOLCOH2	5.69E-08	M
Oxidation state IV model, solubility in 3 × the minimum volume of Castile brine	SOLMOD4	SOLCOH3	5.71E-08	M
Oxidation state IV model, solubility in 4 × the minimum volume of Castile brine	SOLMOD4	SOLCOH4	5.72E-08	M
Oxidation state IV model, solubility in 5 × the minimum volume of Castile brine	SOLMOD4	SOLCOH5	5.73E-08	M

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Table 1. Parameter Data Entry for the Baseline Actinide Solubilities for the CRA-2026 IS (Domski, 2025b, Tables 6 and 7) (continued).

Parameter Description	Material	Property	Value	Units
Oxidation state V model, solubility in the minimum volume of Salado brine	SOLMOD5	SOLSOH	9.75E-07	M (mol/L)
Oxidation state V model, solubility in 2 × the minimum volume of Salado brine	SOLMOD5	SOLSOH2	6.88E-07	M
Oxidation state V model, solubility in 3 × the minimum volume of Salado brine	SOLMOD5	SOLSOH3	5.81E-07	M
Oxidation state V model, solubility in 4 × the minimum volume of Salado brine	SOLMOD5	SOLSOH4	5.24E-07	M
Oxidation state V model, solubility in 5 × the minimum volume of Salado brine	SOLMOD5	SOLSOH5	4.90E-07	M
Oxidation state V model, solubility in the minimum volume of Castile brine	SOLMOD5	SOLCOH	4.01E-06	M
Oxidation state V model, solubility in 2 × the minimum volume of Castile brine	SOLMOD5	SOLCOH2	2.64E-06	M
Oxidation state V model, solubility in 3 × the minimum volume of Castile brine	SOLMOD5	SOLCOH3	2.17E-06	M
Oxidation state V model, solubility in 4 × the minimum volume of Castile brine	SOLMOD5	SOLCOH4	1.93E-06	M

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Table 1. Parameter Data Entry for the Baseline Actinide Solubilities for the CRA-2026 IS (Domski, 2025b, Tables 6 and 7) (continued).

Parameter Description	Material	Property	Value	Units
Oxidation state V model, solubility in 5 × the minimum volume of Castile brine	SOLMOD5	SOLCOH5	1.79E-06	M (mol/L)

REFERENCES

Domski, P.S. 2025a. "Calculation of Organic-Ligand Concentrations for the 2026 WIPP Compliance Recertification Application Performance Assessment Interim State (CRA-2026 IS)". Carlsbad, NM: Sandia National Laboratories.

Domski, P.S. 2025b. "Prediction of Baseline Actinide Solubilities for the 2026 WIPP Compliance Recertification Application Performance Assessment Interim-State Analysis (CRA-2026 IS)". Carlsbad, NM: Sandia National Laboratories.

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