



Model Error Resolution Document

QA: QA
Page 1 of 5

Complete only applicable items.

1. Document Number: ANL-EBS-MD-000045	2. Revision/Addendum: 03	3. ERD: 03
--	---------------------------------	-------------------

4. Title: In-Drift Precipitates/Salts Model	5. No. of Pages Attached: 4
--	------------------------------------

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

This Error Resolution Document (ERD) addresses deficiencies in the documentation of qualification of external source data used as direct input, as originally identified in condition report (CR) 11149, which was closed to CR 10788 as a similar issue. Therefore this ERD will address those similar issues for CR 10788. During the extent of condition evaluation (surveillance LLQA-IS-07-21), a review of ANL-EBS-MD-000045 REV 03 revealed that most of the information required for the qualification of external data was presented in the document, but some of the documentation requirements of SCI-PRO-001, *Qualification of Unqualified Data*, were omitted or needed clarification. The quality of the data is not in question, only the documentation required by SCI-PRO-001. Therefore, there is no impact on the conclusions of this document or impacts on any other documents, including the text, tables or figures of the License Application because ANL-EBS-MD-000045 REV 03 is the only document impacted by the identified changes. This ERD provides the additional documentation to address the deficiencies and fully establish the basis for qualification of data for its intended use.

Deficiency: No qualification plan is provided.

Resolution: The version of SCI-PRO-001 (REV 00) in effect at the time the report was approved required a qualification plan. The current procedure no longer requires a plan. Since a qualification plan would now be ‘after the fact’ and since a plan is no longer required, the lack of a qualification plan is no longer considered a compliance issue. It is considered sufficient to note that the basis for the qualification is now documented in this ERD and in compliance with the current revision of SCI-PRO-001 (REV 09), thus resolving the previous requirement.

Deficiency: No basis for qualification method selection is provided.

Resolution: The following text is added to the second paragraph of Section 4.1.1

“The method for qualification was chosen to be Method 5, *Technical Assessment*. As stated in SCI-PRO-001, Attachment 2, the technical assessment approach is appropriate for use when it is determined that an independent evaluation of the data is needed to raise the confidence of the data to a proper level for the intended use. For this report, the data collection procedures are unavailable for review and/or the documentation of proper data acquisition is unavailable for review, so technical assessment is the appropriate qualification method.”

	Printed Name	Signature	Date
7. Checker	Clinton Lum		2/25/2009.
8. QCS/QA Reviewer	Robert Spencer		2/25/2009
9. Originator	Susan LeStrange		2/25/2009
10. Responsible Manager	Palmer Vaughn		2/25/2009

INTENTIONALLY LEFT BLANK

Deficiency: No specific examples of prior use of data are provided in Table 4-1. In addition, corroboration is used as a qualification attribute for some inputs, but not correctly indicated in Table 4-1.

Resolution: To address this, the following text is added to the end of the second full paragraph on page 4-2:

“For those inputs citing “prior uses of data” as one of the qualification attributes in Table 4-1, the reference where the data have been cited previously are provided in Table 4-1a. For the inputs that have been corroborated with other data, but were not correctly identified in Table 4-1, the additional information is provided in Table 4-1b.”

In addition, Tables 4-1a and 4-1b are added after Table 4-1

Table 4-1a. Supplemental Information to Table 4-1—Prior Use of Data

Type of input	Source	Prior Use of Data
Pitzer ion interaction coefficients and/or osmotic coefficient data; Debye-Hückel A_ϕ parameter	Archer 2000 [DIRS 162065]	Wijesinghe and Rard 2005 [DIRS 176847] Oakes et al. 2000 [DIRS 162102],
	Clegg and Brimblecombe 1990 [DIRS 162067]	Pitzer 1991 [DIRS 152709]
	Clegg et al. 1996 [DIRS 162068]	Rard and Wijesinghe 2003 [DIRS 162327]
	Greenberg and Møller 1989 [DIRS 152684]	Pitzer 1991 [DIRS 152709]
	He and Morse 1993 [DIRS 162090]	Christov and Moller 2004 [DIRS 178396]
	Holmes and Mesmer 1992 [DIRS 162076]	He and Morse 1993 [DIRS 162090]
	Holmes and Mesmer 1983 [DIRS 162073]	Pitzer 1991 [DIRS 152709]
	Holmes and Mesmer 1994 [DIRS 162078]	Christov and Moller 2004 [DIRS 186000]
	Holmes et al. 1987 [DIRS 162075]	Pitzer 1991 [DIRS 152709]
	Königsberger et al. 1999 [DIRS 168345]	Christov and Moller 2004 [DIRS 178396]
	Oakes et al. 2000 [DIRS 162102]	Wijesinghe and Rard 2005 [DIRS 176847]
	Peiper and Pitzer 1982 [DIRS 162097]	Pitzer 1991 [DIRS 152709]
	Pabalan and Pitzer 1987 [DIRS 162096]	Pitzer 1991 [DIRS 152709]
	Pabalan and Pitzer 1987 [DIRS 162147]	Pitzer 1991 [DIRS 152709]
	Pitzer 1991 [DIRS 152709]	Rard and Wijesinghe 2003 [DIRS 162327]
Sternier et al. 1998 [DIRS 162116]	Oakes et al. 2000 [DIRS 162102]	
Thiessen and Simonson 1990 [DIRS 162108]	Pitzer 1991 [DIRS 152709]	
Single-phase mineral thermodynamic data, mineral solubility data, and solubility product constants	Greenberg and Møller 1989 [DIRS 152684]	Pitzer 1991 [DIRS 152709]
	Harvie et al. 1984 [DIRS 118163]	Pitzer 1991 [DIRS 152709]
	Pabalan and Pitzer 1987 [DIRS 162096]	Pitzer 1991 [DIRS 152709]

Table 4-1b. Supplemental Information to Table 4-1—Corroboration with Other Data

Type of input	Source	Qualifications
Pitzer ion interaction coefficients and/or osmotic coefficient data; Debye-Hückel A_ϕ parameter	Archer 2000 [DIRS 162065]	Availability of corroborating data (I.4.4.17, I.5.3)
	Clegg and Brimblecombe 1990 [DIRS 162067]	Availability of corroborating data (I.4.4.7)
	Clegg et al. 1996 [DIRS 162068]	Availability of corroborating data (I.4.4.21)
	Greenberg and Møller 1989 [DIRS 152684]	Availability of corroborating data (I.4.4.9, I.4.4.10, I.4.4.18, I.4.4.19, I.4.4.27, I.4.5.1, I.4.5.2, I.4.5.3, I.4.5.4, I.4.5.6, I.4.5.7, I.4.5.10, I.4.5.11, I.4.5.12, I.4.5.13)
	He and Morse 1993 [DIRS 162090]	Availability of corroborating data (I.4.4.23, I.4.4.24)
	Holmes and Mesmer 1983 [DIRS 162073]	Availability of corroborating data (I.4.4.3, I.4.4.13)
	Holmes et al. 1987 [DIRS 162075]	Availability of corroborating data (I.4.4.4)
	Pabalan and Pitzer 1987 [DIRS 162096]	Availability of corroborating data (I.4.4.14, I.4.4.15)
	Pabalan and Pitzer 1987 [DIRS 162147]	Availability of corroborating data (I.4.4.20)
	Sternier et al. 1998 [DIRS 162116]	Availability of corroborating data (I.4.4.1)
	Thiessen and Simonson 1990 [DIRS 162108]	Availability of corroborating data (I.4.4.22)

In addition, the following references are added to Section 9.1 and to the DIRS:

- [178396] Christov, C. and Moller, N. 2004. "A Chemical Equilibrium Model of Solution Behavior and Solubility in the H-Na-K-Ca-OH-Cl-HSO₄-SO₄-H₂O System to High Concentration and Temperature." *Geochimica et Cosmochimica Acta*, 68, (18), 3717-3739. [New York, New York]: Pergamon. TIC: 258819.
- [186000] Christov, C. and Moller, N. 2004. "Chemical Equilibrium Model of Solution Behavior and Solubility in the H-Na-K-OH-Cl-HSO₄-SO₄-H₂O System to High Concentration and Temperature." *Geochimica et Cosmochimica Acta*, 68, (6), 1309-1331. [New York, New York]: Pergamon. TIC: 260312.

Deficiency: No explicit statement is provided indicating that the data were qualified for intended use.

Resolution: To address this, the following text is added to the end of the second full paragraph on page 4-2:

“Based on the qualification attributes listed in Tables 4-1, 4-1a, and 4-1b, and the information in this section and Appendix I, the external sources of data are judged to be qualified for intended use within the document.”

Deficiency: During the review of the direct inputs, errors in the DIRS were identified. The DIRS entries for “Input usage” for the “Equations and theoretical relations” in Table 4-1 were incorrectly classified as “Direct Input” rather than “Indirect Input”. In addition, the DIRS entries for “Input Category” for some inputs in Table 4-1 were incorrectly labeled as “Data” rather than “Established Fact”.

Resolution: The changes to DIRS to correct the deficiencies are provided in Table 1.

Table 1. Changes to DIRS

Type of Input	Source	Changes Required
Single-phase mineral thermodynamic data, mineral solubility data, and solubility product constants	Barin and Platzki 1995 [DIRS 157865]	Change input category to “Established Fact”
	Linke 1965 [DIRS 166191]	Change input category to “Established Fact”
	Robie and Hemingway 1995 [DIRS 153683]	Change input category to “Established Fact”
Equations and theoretical relations	Garrels and Christ 1990 [DIRS 144877]	Change input usage to “Indirect Input”
	Møller 1988 [DIRS 152695]	Change input usage to “Indirect Input”
	Pitzer 1991 [DIRS 152709]	Change input usage to “Indirect Input”
	Pitzer 1973 [DIRS 152738]	Change input usage to “Indirect Input”
	Rard and Wijesinghe 2003 [DIRS 162327]	Change input usage to “Indirect Input”