

MEMORANDUM OF UNDERSTANDING

between

**Department of Energy, Carlsbad Area Field Office
Los Alamos National Laboratory- Carlsbad Operations**

and

Forschungszentrum Karlsruhe GmbH

The Department of Energy Carlsbad Area Field Office and its Los Alamos National Laboratory subcontractor ("LANL"), acting jointly, and the Forschungszentrum Karlsruhe GmbH ("FORSCHUNGSZENTRUM") (each, a "Participant" and together, the "Participants"),

Noting that LANL is carrying out actinide chemistry research in support of the Waste Isolation Pilot Plant (WIPP) and FORSCHUNGSZENTRUM is carrying out actinide chemistry research under its Nuclear Safety Research Program, respectively;

Recognising the importance of closer cooperation in common fields of actinide chemistry in support of salt-based repository science; and

Desiring to expand scholarly ties and facilitate academic and institutional cooperation subject to realistic constraints of time and funding on a basis of friendship;

Have reached the following understanding:

1. Objectives

The Participants intend to exchange information concerning:

- 1) Pitzer and thermodynamic speciation parameters for high ionic strength brines including updating and revising of the pitzer data base for the relevant chemistry,
- 2) Actinide solubility and redox chemistry in high ionic strength media and variable temperature,
- 3) General actinide issues regarding PA and the Safety Case of a salt-based repository. This cooperation may include exchange of experiences and results of theoretical, experimental and development projects. Cooperation between the Participants should be on the basis of mutual benefit, equality and reciprocity.

2. Liaison

Each Participant should appoint a responsible liaison officer to supervise the conduct of cooperative activities under this Memorandum of Understanding (hereinafter "Memorandum").

3. Forms of Cooperation

Cooperation covers the following forms:

- Exchange of information;
- Organisation of technical meetings, symposia or training courses;
- Exchange of students and post-doctoral researchers to make use of specific research infrastructures and human expertise.

4. Specific Cooperation

As appropriate, the execution of any specific cooperation should be subject to a separate prior written arrangement between the Participants (Specific Arrangement). Each Specific Arrangement should contain all relevant details of the execution of the cooperation, including such matters as the terms of assignment/exchange of staff, and the protection of business-confidential information.

5. Costs

All costs resulting from cooperation under this Memorandum are to be borne by the Participant that incurs them. In particular, when an exchange of staff is contemplated, the sending Participant is responsible for the salaries, insurance, benefits, travel expenses, and allowances to be paid to its personnel.

6. General Provisions

(1) This Memorandum does not create any legally binding obligations between the Participants.

(2) Each Participant should conduct the activities contemplated by this Memorandum in accordance with the applicable laws and regulations in force in its country.

(3) Cooperation under this Memorandum may commence upon signature.

(4) This Memorandum may be revised or discontinued at any time by the Participants' mutual consent in writing. If a Participant desires to discontinue its participation in this Memorandum it should endeavour to provide at least six months written notice to the other Participant.

Signed in duplicate.

For the Department of Energy, Carlsbad Area Field Office

Signed: David C. Moody

Dave Moody, Manager DOE-CBFO

Date: 7/13/09

For the Los Alamos National Laboratory - Carlsbad Office

Signed: [Signature]

Ned Elkins, EES-12 Group Leader

Date: 6-24-09

For the Forschungszentrum Karlsruhe GmbH

Signed: R. K. [Signature] [Signature]

Member of the Board of Directors

Member of the Board of Directors

Date: 17.06.2009