

SPECIFIC MEMORANDUM OF AGREEMENT

between

THE UNITED STATES DEPARTMENT OF ENERGY

and

THE UNITED KINGDOM ATOMIC ENERGY AUTHORITY

in the area of

SOLVENT EXTRACTION CENTRIFUGAL CONTACTORS

JULY 5, 1988

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This Agreement to be called the "CENTRIFUGAL CONTACTOR SMA" is made between the UNITED STATES DEPARTMENT OF ENERGY (hereinafter referred to as "DOE") and the UNITED KINGDOM ATOMIC ENERGY AUTHORITY (hereinafter referred to as "UKAEA") (hereinafter jointly called the "Parties").

WHEREAS

the Energy Research and Development Administration (ERDA) and UKAEA under the Liquid Metal-Cooled Fast Breeder Reactors Agreement of 20 September 1976, as extended by letter agreements (hereinafter referred to as "the LMFBR Agreement") agreed to establish a reasonably balanced exchange of LMFBR technology;

pursuant to the Department of Energy Organization Act, ERDA was abolished and all functions transferred to and vested in DOE;

both DOE and UKAEA have an interest in providing close cooperation among design research and development personnel and safety assessment personnel;

both DOE and UKAEA have been cooperating for a number of years in the development of techniques for the solvent extraction of fissile material in fuel reprocessing plants, in particular by the use of Centrifugal Contactors, with a view of eventual testing on a reprocessing plant, and the cooperation has now reached a stage at which further advance would be facilitated by a Specific Memorandum of Agreement on the topic;

the DOE's Oak Ridge National Laboratory (ORNL) has considerable expertise in the development of Centrifugal Contactors for incorporation into future reprocessing plants;

the UKAEA has a plant for reprocessing LMFBR fuel from its Prototype Fast Reactor (PFR) and supporting test facilities at Dounreay Nuclear Power Development Establishment (DNE) in Scotland, and in addition the UKAEA has a requirement to develop alternative extraction process equipment for fissile materials in reprocessing plants; and

the Parties believe that a joint project for collaboration in the development and application of Centrifugal Contactors for fissile material extraction, coupled with the experience obtained during plant operations, would be of significant benefit to the Parties.

IT IS AGREED AS FOLLOWS:

ARTICLE 1 - OBJECTIVE

- 1.1 The objective of cooperation under this Specific Memorandum of Agreement (SMA) is to establish and to carry out a joint experimental and analytical program (hereinafter referred to as the "Program") to investigate the performance of Centrifugal Contactors for the extraction of fissile material and to exchange information derived from the Program.
- 1.2 This cooperation shall be a joint project under and as envisaged in the LMFBR Agreement.

ARTICLE 2 - PROGRAM

- 2.1 A joint Program designed to meet the objectives of this SMA has been agreed between the Parties and is given in the Appendix. It is recognized at the outset that this Program may be subject to changes as the work progresses. Any changes to the Program shall require the prior agreement in writing of the Parties.
- 2.2 In summary, the Program envisages:
 - (a) Visits and attachment, as required, of ORNL staff to DNE and of UKAEA staff to ORNL for the purpose of discussions on, and participation in, the Program.

- (b) The supply, on loan, by DOE of several banks of Centrifugal Contactors for the purpose of the Program.
- (c) Transport of the above equipment from DOE to DNE and, unless agreed otherwise, the return of the above equipment from DNE to DOE.
- (d) Implementation of the Program for the application of this equipment in DNE test rigs and later in the PFR Fuel Reprocessing Plant.
- (e) Recording and exchange between the Parties of agreed data analysis and results arising from the Program in each of the Party's facilities.
- (f) Preparation and exchange between the Parties of agreed reports during the Program and preparation of a joint report at the end of the Program.

ARTICLE 3 - PROVISION OF COMPONENTS AND SERVICES

3.1 To meet the requirements of the Program defined in the Appendix DOE shall, at its own expense:

- (a) Discuss and agree with UKAEA on an experimental plan to carry out the Program.

- (b) Arrange and provide for the attachment and visits of ORNL staff to DNE where appropriate in accordance with paragraph 3.3 of this SMA and Article 9 of the LMFBR Agreement.
- (c) Provide suitable office facilities for the UKAEA attached staff to enable them to fulfill the agreed function of participation in the Program.
- (d) Supply on loan ORNL Centrifugal Contactors for the purpose of the agreed Program. The details of the loan shall be the subject of separate written arrangements between Martin Marietta Energy Systems, and the UKAEA.
- (e) Provide to UKAEA, reports, general arrangements or layout drawings for placement of equipment components, and sufficient details of the above equipment necessary for the implementation of the Program.
- (f) Arrange and provide for transport of the above equipment to an agreed point of entry into the UK.
- (g) Responsibility for expenses, safekeeping and insurance during the transport of the equipment from the original location in the country of the sending Party to the place of entry in the country of the receiving Party shall rest with the sending

Party. If returned the sending Party it shall be responsible for expenses, safekeeping, and insurance during the transport of the equipment from the original point of entry in the country of the receiving Party to the final destination in the country of the sending Party.

(h) Responsibility for expenses, safekeeping, and insurance during the transport of the equipment from the place of entry in the country of the receiving Party to the final destination in the country of the receiving Party shall rest with the receiving Party. If returned, the receiving Party shall be responsible for expenses, safekeeping, and insurance during the transport of the equipment from the final destination in the country of the receiving Party to the original point of entry in the country of the receiving Party.

(i) The host establishment shall provide the necessary premises and shelter for the equipment, etc., and shall provide for electric power, water, gas, etc., in accordance with technical requirements which shall be mutually agreed upon.

3.2 To meet the requirements of the Program defined in the Appendix the UKAEA shall at its own expense:

- (a) Discuss and agree with DOE on an experimental plan to carry out the Program.
- (b) Arrange and provide for visits and attachment of UKAEA staff to ONRL where appropriate in accordance with paragraph 3.3 of this SMA and Article 9 of the LMFBR Agreement.
- (c) Provide suitable office facilities for the ONRL attached staff to enable them to fulfill the agreed function of participation in the Program.
- (d) Install the ORNL Centrifugal Contactor equipment in the DNE test facilities or the PFR Fuel Reprocessing Plant.
- (e) Be responsible for the preparation of any documents necessary for securing approval at DNE for utilizing the equipment provided by DOE, in the DNE facilities.
- (f) Implement the agreed program of trials in the DNE facilities.
- (g) Be responsible for the recording of agreed data from the tests in 3.2(f) and make them available to DOE.
- (h) Arrange and provide for the return of the above equipment to DOE, unless agreed otherwise by DOE.

- 3.3 Each Party shall at its own expense have the right to observe measurement performance at the other Party's facilities. This right may be exercised by short term visits or by the attachment of staff subject to prior agreement on each occasion. The Party proposing an attachment shall notify the receiving Party of the names of the persons proposed for attachment and shall provide such information and complete such other written arrangements in respect to any of the said persons as may be required by the Parties. The receiving Party may either approve or reject any persons so proposed and may at any time during the continuance of this Agreement without stating any reason revoke any approval previously given.
- 3.4 The Parties each propose to analyze the results arising from the Program according to their own requirements at their own expense. However, each Party shall inform the other Party of its intentions in this respect so as to provide for the possibility of cooperation on appropriate aspects of the analysis if desired between the Parties.
- 3.5 Termination costs if any shall be borne by each Party for the portion of the Program that Party is obligated to perform.
- 3.6 Except where otherwise provided, all costs incurred from the performance of the Program shall be borne by the Party that incurs them.

3.7 Each Party shall be responsible for obtaining any documentation, customs clearance or other procedures necessary to permit the import or export of the Centrifugal Contactor equipment into or out of its own country.

ARTICLE 4 - GENERAL PROVISIONS

4.1 Articles 7, 8 (para 1.b, 2 and 3 only), 9 and 11 of the LMFBR Agreement are hereby incorporated by reference. With the exception of the following modification, Article 6 of the LMFBR Agreement is hereby incorporated by reference in its entirety:

"6.2.A(ii) The term "proprietary information" means information developed prior to or outside this Agreement which contains trade secrets or commercial or financial information which is privileged or confidential, and may only include such information which:

- a) has been held in confidence by its owner;
- b) is of a type which is customarily held in confidence by its owner;
- c) has not been transmitted by the transmitting Party to other entities (including the receiving Party) except on the basis that it be held in confidence; and

d) is not otherwise available to the receiving Party from another source without restriction on its further dissemination."

The Parties agree that information arising from joint activities conducted under this Agreement shall be designated proprietary if the Parties mutually agree that it discloses or can reveal proprietary information that has been developed outside the scope of the Agreement.

Handwritten initials: "DB" and "DER" with a line through it.

4.2 The LMFBR Agreement is hereby attached to the SMA as a reference document.

4.3 Implementation of this SMA is subject to the availability of appropriated funds.

ARTICLE 5 - USE AND DISCLOSURE OF INFORMATION

5.1 The Parties shall provide to each other sufficient information of the Centrifugal Contactor equipment and the DNE facilities to enable each Party to fulfill its commitments under this SMA including the requirements of Article 3.2(e) above.

5.2 The Parties shall produce an agreed schedule for testing and analysis and each Party shall promptly disclose to the other Party all information arising from the testing and analysis of results obtained under the Program.

5.3 The Parties recognize that in certain cases, information contained in the results of activities conducted during the Program may

disclose proprietary information as defined in Article 6 of the LMFBR Agreement. Such information shall be identified as soon as possible after it arises by the Party asserting that its proprietary information may be disclosed and the other Party advised of its identification. Results which disclose proprietary information shall be controlled as provided in Article 6 of the LMFBR Agreement. Either Party may provide to the other a non-exclusive list of those types of information arising under the Program which may disclose proprietary information as defined in Article 6 of the LMFBR Agreement and which are to be treated as prescribed therein.

- 5.4 Each Party shall make available to the other Party information from other programs of work agreed to be specific to the Program and may agree to exchange computer programs to implement or support the Program.
- 5.5 The Parties may publish jointly or either Party may publish individually a series of reports after mutual agreement in writing of the tests and analysis of the results.

ARTICLE 6 - MANAGEMENT OF THE PROGRAM

- 6.1 Pursuant to the terms of Article 4 of the LMFBR Agreement the DOE/UKAEA Joint Coordinating Committee shall be responsible for

review, evaluation, assessment and approval of the Program to be implemented under this SMA.

6.2 One person shall be nominated by each Party for the purpose of day-to-day management of the Program in the country of that Party.

6.3 Each Party shall nominate one or more representatives who, at periodic meetings, shall together review the progress of the Program and consider and, where appropriate, make decisions and put such decisions in writing consistent with paragraph 2.1, on any necessary or desirable modifications to the Program taking into account information arising from the Program and elsewhere, and shall report such decisions to the persons nominated for day-to-day management of the Program for implementation.

6.4 Each Party shall nominate one representative to be responsible for coordinating the arrangements for all transport of material or equipment required by the Program.

ARTICLE 7 - FACILITIES AND EQUIPMENT

7.1. In the event that equipment, other than that agreed in support of the Centrifugal Contractors is to be provided by one Party to the other Party for the purposes of implementing the Program, the loan or transfer of ownership of such equipment shall be the subject of separate written agreements as may be required by the Parties.

7.2 Each Party shall at all times be responsible for the operation of its own facilities and for any consequences arising from such operation. The Parties shall discuss any modifications to the Program which may be necessary for safety or operational reasons but each Party shall retain the right to suspend operation of its facilities at any time for operational or safety reasons.

ARTICLE 8 - PATENTS

8.1 In accordance with paragraph 1.c of Article 8 of the LMFBR Agreement, DOE shall acquire all right, title and interest in and to any inventions or discoveries made or conceived in the course of or under this SMA, which are improvements to the equipment provided by DOE pursuant to paragraph 3.1(d), in its own country and in third countries, subject to a non-exclusive, irrevocable, royalty-free license in all such countries to UKAEA, its Government, and its nationals designated by it. UKAEA shall acquire all right, title and interest in and to such improvements in its own country, subject to a non-exclusive, irrevocable, royalty-free license to DOE, its Government and its nationals designated by it.

8.2 In accordance with paragraph 1.c of Article 8 of the LMFBR Agreement, UKAEA shall acquire all right, title and interest in and

to any inventions or discoveries made or conceived in the course of or under this SMA, which relate to the installation provided by UKAEA pursuant to paragraph 3.2(d), in its own country and in third countries, subject to a non-exclusive, irrevocable, royalty-free license in all such countries to DOE, its Government, and its nationals designated by it. DOE shall acquire all right, title and interest in and to such improvements in its own country, subject to a non-exclusive, irrevocable, royalty-free license to UKAEA, its Government and its nationals designated by it.

8.3 With regard to other inventions or discoveries made or conceived in the course of or under this SMA, the provisions of paragraph 1.b of Article 8 of the LMFBR Agreement shall apply.

8.4 With regard to all inventions or discoveries made or conceived in the course of or under this SMA, the provisions of paragraph 3 of Article 8 of the LMFBR Agreement shall apply.

ARTICLE 9 - LIABILITY

9.1 Equipment loaned by one Party to the other Party under this SMA shall be suitable for its prescribed duty to the best knowledge and belief of the Loaning Party. However, the Loaning Party shall not be responsible for mal-operation or accident that may occur whilst the equipment is being used at the other Party's Facility.

9.2 Compensation for damages incurred during the implementation of this SMA shall be in accordance with the applicable laws of the countries of the Parties.

ARTICLE 10 - DELAYS

If, during the course of this SMA, any event occurs which significantly delays the Program, the Parties shall discuss the action to be taken to achieve an equitable solution.

ARTICLE 11 - DURATION AND TERMINATION

11.1 This SMA shall enter into force upon the latter date of signature and, except as provided in Article 11.2 and 11.3, shall continue for a five-year (5) period.

11.2 This SMA may be amended or extended at any time by mutual agreement of the Parties in writing.

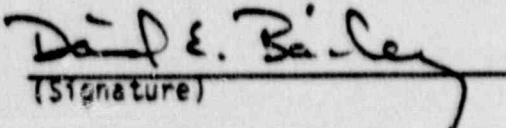
11.3 This SMA may be terminated at any time at the discretion of either Party upon one year's advance notification in writing by the Party seeking to terminate the SMA. Such termination shall be without prejudice to the rights which may have accrued under this SMA to either Party up to the date of such termination.

11.4 In the event of termination of this SMA, Articles 6, 7, and 8 (para 1.b, 2 and 3 only) of the LMFBR Agreement incorporated by reference into this SMA and Articles 5 and 8 of this SMA shall survive its termination.

11.5 In the event of termination by either Party pursuant to Article 11.3 after completion of the Centrifugal Contactor trials at DNE, all information and results available up to the time of such termination shall be exchanged by the Parties under the terms of the SMA.

Done in duplicate at

FOR THE UNITED STATES
DEPARTMENT OF ENERGY

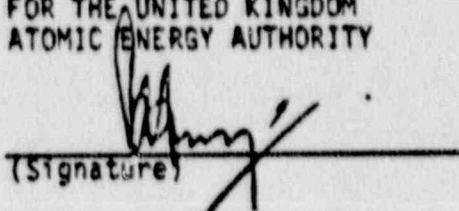

(Signature)

David E. Bailey
(Printed Name)

Director, Division of Fuels
and Reprocessing
(Title)

February 25, 1988
(Date)

FOR THE UNITED KINGDOM
ATOMIC ENERGY AUTHORITY


(Signature)

H B Hickey
(Printed Name)

Manager, Process Technology
Branch
(Title)

5 July 1988
(Date)

APPENDIX 1

DESCRIPTION OF CENTRIFUGAL CONTACTOR PROGRAM

The program of work under this SMA shall comprise:

I

A. DOE CONTRIBUTION

1. DOE shall provide three tested four-stage 5.5 cm Centrifugal Contactors (plus one single-stage unit manufactured in clear plastic for familiarization studies) complete with drives and control gear.
2. DOE shall provide detailed drawings of all manufactured components to provide for appropriate hook-up and maintenance of the equipment.
3. DOE shall provide installation recommendations and mounting requirements.
4. DOE personnel shall provide on-site assistance as necessary during the commissioning of the unit.
5. DOE shall provide the necessary existing software control algorithms.

B. DOE BENEFITS

1. DOE would obtain confirmation of contactor operation for U feeds at different TBP concentrations.

DEB

2. DOE would obtain information on contactor operation for feeds containing U and Pu, in the absence of fission products, under extract, backwash and U/Pu separation modes including mixed nitric/sulphuric streams.
3. DOE would obtain information on contractor operation for feeds containing U and Pu in the presence of some fission products, under extract conditions.
4. DOE would obtain information on the operation, behavior and application of a spectrophotometer control system if one is used.
5. DOE would obtain reliability data for the hardware under field tests in a plutonium active but non-gamma radiation environment.
6. DOE would obtain reliability data for the hardware under field tests in a gamma radiation environment.

II

A. UKAEA CONTRIBUTION

1. Make available a laboratory test rig for confirmatory U trials of the DOE centrifugal contactor at 20% TBP with a UKAEA-associated spectrophotometer control system.
2. Make available the D2670 Pulsed Column Glovebox for mounting and subsequent trials of the DOE centrifugal contactor on uranium-

plutonium plant streams with a UKAEA-associated spectrophotometer control system.

3. Make available a location in D1206 for mounting and subsequent trials of the DOE centrifugal contactor on uranium-plutonium-fission product plant streams with a UKAEA-associated spectrophotometer control system.
4. Make existing UKAEA spectrophotometer equipment available for use with the DOE equipment as far as is practicable.
5. Provide full analytical services to quantify contact operation.
6. Provide measurement of any physical property data required to characterize operational behavior of the contactor.
7. Make existing UKAEA data interpretation procedures available for the above requirements.
8. Develop measurements and interpretation procedures in conjunction with DOE which optimize the UKAEA control system for use with UKAEA flowsheets.
9. Make available and evaluate alternative sensors where spectrophotometric devices cannot be used.

B. UKAEA BENEFITS

1. Information of the operating characteristics of a bank of centrifugal contactors for LMFBR fuel reprocessing under a variety of conditions.
2. Information on the feasibility of in-line control of centrifugal contactors under a variety of operating conditions.
3. Information on the startup, shutdown, washout and accountancy of a bank of centrifugal contactors.
4. Information on the installation and mechanical reliability of in-cell centrifugal contactors.
5. Providing design information for fitting similar equipment to similar plants or for fitting to new plants.
6. Operating information on the reliability of the spectrophotometer detector head.



Department of Energy
Washington, DC 20545

NOV 8 1989

Mr. H. B. Hickey, Manager
Process Technology Branch
United Kingdom Atomic Energy Authority
Risley, Warrington, Chesire WA3 6AT
United Kingdom

Dear Mr. Hickey:

In the Specific Memorandum of Agreement between the United States Department of Energy and the United Kingdom Atomic Energy Authority in the area of Solvent Extraction Centrifugal Contactors that was entered into force on July 5, 1988, it is recognized (Article 2, paragraph 2.1) that the Program, as given in Appendix 1 to the Agreement, may be subject to changes as the work progresses. It is also stated (paragraph 2.1) that "Any changes to the Program shall require the prior agreement in writing of the Parties." The Program description (Appendix 1, I.A.1.) provides that the United States Department of Energy shall supply three tested four-stage 5.5 cm Centrifugal Contactors to the United Kingdom Atomic Energy Authority.

At the meetings in Risley, United Kingdom, on 19 October 1989, the principal fuel cycle coordinators, R. H. Allardice for the United Kingdom and D. E. Bailey for the United States, agreed that there are mutual program benefits in having all centrifugal contactor housings in an uncontaminated state before introducing them into the Centrifugal Contactor Facility, Building No. D1206, at the Dounreay Nuclear Power Development Establishment. It was further agreed that the most effective way to accomplish this would be for the United States Department of Energy to supply on loan to the United Kingdom Atomic Energy Authority three additional housings for the four stage 5.5 cm Centrifugal Contactors per Article 2, paragraph 2.2 (b) and Article 3, paragraph 3.1 (d).

I am, therefore, pleased to propose that this letter and your favorable reply shall have the effect of amending the Program in the Agreement as given in Appendix 1 to read:

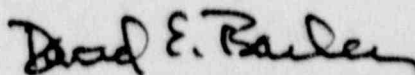
"1

A. DOE CONTRIBUTION

1. DOE shall provide three tested four-stage 5.5 cm Centrifugal Contactors (plus one single-stage unit manufactured in clear plastic for familiarization studies) complete with drives and control gear. In addition, DOE shall provide three spare housings for the contactors."

All other elements of the Program remain in effect as do all provisions of the Agreement.

Sincerely,



David E. Bailey, Director
Division of Fuels and Reprocessing
Office of Facilities, Fuel Cycle,
and Test Programs
Office of Nuclear Energy



NRL

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16 November 1989

Mr D E Bailey, Director
Division of Fuels and Reprocessing
Office of Facilities, Fuel Cycle
and Test Programmes
Office of Nuclear Energy
US Department of Energy

Dear Mr Bailey

Thank you for your letter of 8th November 1989 proposing an amendment to the Specific Memorandum of Agreement between the United States Department of Energy and the United Kingdom Atomic Energy Authority in the area of solvent extraction centrifugal contactors that was entered into force on 5th July 1988.

By this letter I confirm that we agree to the proposal in your letter to amend the programme as given in Appendix 1 of the Agreement and we agree that all other elements of the programme remain in effect as do all provisions of the Agreement.

Yours sincerely

H B Hickey
Manager, Process Technology Branch
Technology Assessments Division