

PROJECT AGREEMENT
BETWEEN
THE DEPARTMENT OF ENERGY OF THE UNITED STATES OF AMERICA
AND
THE UNITED KINGDOM ATOMIC ENERGY AUTHORITY
ON
A COLLABORATIVE PROGRAM
FOR THE DEVELOPMENT OF MATHEMATICAL COMPUTER MODELS FOR
FUSION MATERIALS AND RELATED BOUNDARY PLASMA CONDITIONS

The Department of Energy of the United States of America (USDOE) and the United Kingdom Atomic Energy Authority (UK Atomic Energy Authority), hereinafter the "Parties":

Noting the Agreement for Cooperation between the Department of Energy of the United States of America and the European Atomic Energy Community Represented by the Commission of the European Communities in the Field of Fusion Energy Research and Development of May 14, 2001, as extended, (hereinafter referred to as the "Agreement");

Noting also that the bilateral cooperation in the field of fusion energy research is performed also under the framework of the U.S.-EU Energy Council Working Group-II on Technology, Research, Development and Demonstration, subgroup 'Fusion Energy and Science';

Desiring to establish a framework for cooperation under the Agreement between USDOE's Lawrence Livermore National Laboratory (LLNL) and the Culham Centre for Fusion Energy (CCFE), which is owned and operated by the UK Atomic Energy Authority, for joint research in areas related to the development of advanced mathematical computer models for predicting the performance of materials under conditions expected in thermal and radiation environments of a fusion power plant and related boundary plasma conditions; and

Acting in accordance with Article V of the Agreement,

Have agreed as follows:

Section 1 OBJECTIVE

- 1.1 The objective of this Project Agreement is to establish a framework for LLNL and CCFE to collaborate in joint research on topics identified in Section 2 of this Project Agreement.
- 1.2 This Project Agreement is subject to and governed by the Agreement.

Section 2 TECHNICAL SCOPE

The technical scope of this Project Agreement is as follows:

- 2.1 Exploration and development of advanced mathematical models for predicting the performance of candidate materials under radiation and thermal conditions expected in a fusion power generating system;
- 2.2 Analysis of fundamental science experimental data on the behaviour of materials under fusion-relevant conditions, and the exploration of new materials systems and concepts required for the development of efficient fusion power generation;
- 2.3 Exploration of synergies with other topics in science and technology that may assist in the identification of innovative materials options and engineering solutions for the fusion power plant technology;
- 2.4 Exploration and development of advanced mathematical models for predicting the characteristics of boundary plasmas and the associated particle and line-radiation fluxes incident on materials, including those from steady-state operation and from transient events such as edge localized modes and plasma disruptions. Analyze alternate magnetic designs to minimize plasma heat fluxes;
- 2.5 Exploration of advanced models for tritium migration into materials and the impact of material erosion on fusion plasma performance, and strategies for coupling material and plasma models at the surface interface; and
- 2.6 Other subjects as LLNL and CCFE may agree to in writing.

Section 3 MANAGEMENT

- 3.1 LLNL and CCFE shall each designate a Principal Coordinator to supervise activities under this Project Agreement.

- 3.2 Each Principal Coordinator may appoint a Technical Coordinator to supervise each area of collaboration identified in Section 2 of this Project Agreement. The Technical Coordinators shall develop their own procedures to fulfil their functions as agreed by the Principal Coordinators.

Section 4

EXCHANGE OF PERSONNEL

Each Party may assign its appropriate staff to the other Party to conduct the activities planned under this Project Agreement. Such exchanges of personnel shall be in accordance with Article VIII of the Agreement.

Section 5

EXCHANGE OF EQUIPMENT

The Parties may exchange equipment needed for carrying out the collaborative program. Such exchanges of equipment shall be in accordance with Article IX of the Agreement.

Section 6

INFORMATION USE AND DISCLOSURE; INTELLECTUAL PROPERTY

Information use and disclosure under this Project Agreement shall be in accordance with Article VI of the Agreement. The protection and allocation of intellectual property created or furnished in the course of collaborative activities under this Project Agreement shall be governed according to Article VII of the Agreement by the provisions of Annex A "Intellectual Property Rights" of the Agreement.

Section 7

GENERAL PROVISIONS

- 7.1 Unless otherwise specifically agreed in writing by the Parties, all costs and expenses of each Party resulting from or connected with this Project Agreement shall be borne by the Party that incurs them.
- 7.2 Any questions of interpretation or implementation relating to this Project Agreement arising during its term shall be resolved by consultations between the Parties in accordance with Article X of the Agreement.
- 7.3 Any ongoing joint activities, projects, and experiments for this Project Agreement not completed at termination of the Agreement may be continued until their completion in accordance with Article XI of the Agreement.

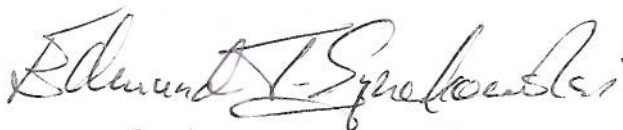
Section 8
ENTRY INTO FORCE, AMENDMENT, AND TERMINATION

- 8.1 This Project Agreement shall enter into force upon signature by both Parties, and remain in force as long as the Agreement remains in force.
- 8.2 This Project Agreement may be amended at any time by written agreement of the Parties as long as the Agreement remains in force.
- 8.3 The Parties may terminate this Project Agreement at any time by mutual consent in writing. Alternatively, a Party that wishes to terminate its participation in this Project Agreement should provide at least six months advance notification in writing to the other Party.
- 8.4 In the event that, during the term of this Project Agreement, the nature of either Party's magnetic fusion program should change substantially, whether by substantial expansion, reduction or transformation, or by amalgamation of major elements with the magnetic fusion program of a third party, that Party shall immediately inform the other Party in writing with a view to making any necessary revisions in the scope of this Project Agreement.

IN WITNESS WHEREOF, the undersigned, duly authorized, have signed this Project Agreement.

DONE in duplicate.

**FOR THE DEPARTMENT OF ENERGY
OF THE UNITED STATES OF AMERICA:**



Date: *October 26, 2012*
Place: Washington

**FOR THE UNITED KINGDOM
ATOMIC ENERGY AUTHORITY:**



Date: *January 4th 2013.*
Place: Culham, Oxfordshire