Action Sheet 6

between

The Euratom Safeguards Directorate of the Commission of European Communities
and
The Department of Energy (DOE) of USA

for

Underwater Neutron Measurements of Fresh MOX fuel

1. Introduction

Under Article 3.1 of the Agreement between Euratom and DOE for Cooperation in Nuclear Material Safeguards Research and Development (hereafter called the "Agreement") signed on January 6, 1995, DOE and Euratom undertake to carry out a cooperative effort on the development of underwater neutron measurements of fresh MOX fuel.

2. Scope of Work

This Action Sheet provides for collaboration on the development and testing of an underwater neutron coincidence counter to measure fresh MOX fuel. The work performed under this Action Sheet shall be performed at the Los Alamos Laboratory (LANL) and by EURATOM personnel at European facilities in accordance with the terms and conditions of the Agreement.

3. Program Management

LANL is responsible for the design and development of the measurement system, physics, simulations and analysis methods. EURATOM is responsible for the tests and evaluation of measurement systems and physics analysis programmes. Work to be done jointly is identified in Appendix I and is limited to that statement of work. Appendix II identifies key personnel associated with this action sheet.

DOE and LANL shall work directly with EURATOM in planning measurements, resolving programmatic and technical questions, conducting and documenting tests and evaluating results. At the conclusion of this work, LANL will provide a final report on its findings and any recommendations for the implementation of the underwater neutron measurement system in safeguards measurements.

4. Financial Management

EURATOM shall provide the DOE with the funds necessary to complete the proposed activities related to the development and delivery of an underwater neutron coincidence counter to measure fresh MOX as described in Appendix I of this Action Sheet.

All contributions by EURATOM shall be due and payable within sixty days of receipt-by EURATOM of an invoice from DOE.

5. Duration and Termination

This Action Sheet shall enter into force upon the later date of signature, and shall continue in force for a two year period, or until mutually agreed by the parties that all activities under this Action Sheet are judged to be completed by DOE and Euratom.

For the Euratom Safeguards Directorate	For the United States Department of Energy
Signature	Signature
W. Gmelin	Dr. K. E. Sanders
Type or Print Name	Type or Print Name
Director	Director International Safeguards Div.
Title	Title
11.09.1997	2 Oct. 1997
Date	Date

Appendix I
Description of Tasks

1. OBJECTIVE

The Safeguards Science and Technology group (NIS-5) at LANL has experience in developing nondestructive assay technologies designed to nondestructively provide assays of nuclear material. Los Alamos is developing a neutron coincidence counter to measure fresh MOX fuel underwater, Collaborations between LANL and EURATOM on the design and testing of the underwater coincidence counter (UWCC) will prove the feasibility of the technique and qualify the measurement capability of the instrument. Measurements on selected MOX assemblies will be collected by EURATOM personnel at European facilities. LANL personnel will participate in appropriate measurements and will collaborate jointly with EURATOM personnel in review and analysis of measurement data.

2. SCOPE

This project entails development of an underwater measurement system, measurement of MOX fuel, development and testing of physics analysis algorithms, and evaluation of the ability to assay fresh MOX fuel underwater. The scope of this study involves joint activities between LANL and EURATOM to develop the measurement system, collect measurements, obtain technical data, develop and evaluate physics analysis methods and document and provide evaluations of the study.

3. TASKS

3.1 Develop Work Plan

LANL and EURATOM will jointly develop a work plan that specifies the measurement system, MOX fuel, measurements, analysis and evaluation activities.

3.2 Measurement System and Samples

Define facilities, equipment, software and samples for measurements. Specify the measurement regime and the form and method to exchange data

3.3 Develop Measurement System

Procure and develop the measurement system and deliver to EURATOM.

3.4 Analysis

Perform analysis and apply physics algorithms to test methods to measure MOX fuel underwater. Based on analysis results additional measurement may be specified.

3.5 Evaluation

LANL and EURATOM will jointly evaluate results of measurements and analysis and provide documentation and final evaluation of the results,

3.6 Project Schedule

Date	Action	Responsible
Month 1	Develop Work Plan	LANL/EURATOM
Month 4	Define Measurement System and Samples	LANL/EURATOM
Month 15	Develop Measurement System	LANL
Month 18	Measurements and Analysis	EURATOM/LANL
Month 20	Evaluation	EURATOM/LANL
Month 24	Documentation	EURATOM/LANL

3.7 Payment schedule

I) First payment	$30,000 upon signature
ii) Second payment	$30,000 upon delivery of Hardware under task 3.3
iii) Third payment	$30,000 upon completion of task 3.4
iv) Fourth payment	$20,000 upon completion of all tasks

'Appendix II
Key Personnel

EURATOM

1. Winfried Kloeckner
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   L-2920 Luxembourg
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2. Peter Chare
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3. Peter Schwalbach
   EURATOM Safeguards Directorate
   Cube 012
   L-2920 Luxembourg
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Department of Energy

1. DOE Headquarters
   Kenneth Sanders, Director
   Gordon Washburn, Task Officer
   International Safeguards Division
   Office of Arms Control and Nonproliferation (NN-44, GA0 17)
   US Department of Energy
   1000 Independence Ave., SW
   Washington, DC 20585

2. DOE-Albuquerque Operation Office
   James R. Anderson, Director
   Science and Technology Transfer Division
   DOE/Albuquerque Operations Office
   P.O. Box 5400
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3. Los Alamos National Laboratory
   Howard Menlove
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