ACTION SHEET 7

The United States Department of Energy (DOE)

and

The Japan Atomic Energy Research Institute (JAERI)

for

Study of Design and Evaluation of a Near-Real-Time Accounting System

Pursuant to the DOE/JAERI Agreement Concerning Research and Development in Nuclear Material Control, Accountancy, Verification, and Physical Protection, DOE and JAERI agree to carry out the cooperative effort outlined in this Action Sheet.

A. Objective

To participate in a joint study of design and evaluation of a near-real-time accounting (NRTA) system for a selected nuclear facility.

B. Current Activities

1. DOE activities relevant to NRTA.

Los Alamos National Laboratory (LANL) has performed detailed studies on the application of NRTA to various facilities, demonstrated NRTA at the Barnwell reprocessing plant, and developed computer models of nuclear materials accounting for facilities in the U.S. Extensive work has been performed on various data collection and analysis techniques, verification methods for IAEA use, and analysis of detection sensitivity for NRTA techniques at reprocessing plants.

2. JAERI Activities relevant to NRTA.

JAERI has performed detailed studies of NRTA applications to various types of facilities, including field tests of a NRTA model at the Tokai reprocessing plant. JAERI has performed a preliminary design of NRTA system for the Nuclear Criticality Evaluation Facility (NUCEF). JAERI has dispatched a JAERI staff (Mr. Tetsuo Oda) to LANL since December 1, 1993. Mr. Oda plans to remain in at LANL until September 1995.

C. Proposed Cooperative Activities

JAERI and LANL have a joint interest in exchanging technical information on systems studies and software for near-real-time accounting. This Action Sheet is prepared to facilitate this exchange by the visit of a JAERI staff (Mr. T. Oda) to LANL for the purpose of collaborating in the following areas. Appendix I is a provisional schedule of

activities.

1. System Studies

JAERI and LANL will select a nuclear processing facility and collaborate on a systems study to design and evaluate a near-real-time accounting system. This study will define an accounting strategy, including material balance areas, measurement locations and methods, and data analysis methods, and evaluate the loss detection sensitivity of the accounting system. These studies will employ the variance propagation, simulation and data analysis software as part of the design and evaluation process. Results of the study will be summarized in a joint report.

2. Variance Propagation Software

LANL has developed variance propagation software for systems design studies and for analysis of operational accounting data. LANL will transfer this technology to JAERI and collaborate in applying the software to selected applications to be defined by JAERI.

3. Simulation Software

LANL has developed simulation software for modeling nuclear processing operations and measurement systems. This software can be used in studying options for operating a nuclear process and for evaluating accounting strategies. LANL and JAERI will collaborate in modeling selected nuclear facilities and their near-real-time accounting systems.

4. Data Analysis Methods

JAERI and LANL will collaborate on a comparative study of methods for detecting anomalies in near-real-time accounting data. Each laboratory will propose statistical testing procedures and evaluate their effectiveness in detecting material losses using simulated data.

5. Nondestructive Assay Methods

As time permits, Mr. Oda will work with personnel in the Non-Destructive Assay Group at LANL to become more familiar with non-destructive assay measurement methods. In particular, Mr. Oda will be involved in the following activities:

* Get a fundamental knowledge of conventional coincidence counter methods through actual measurement of Pu or Cm. In these measurements, known alpha, known M, and dead time correction methods will be investigated.

* Get a fundamental knowledge of multiplicity counting methods through actual measurement of Pu or Cm. In these measurements, multiplicity distributionsand dead time corrections will be investigated.

* Learn adaptability of neutron shuffler methods to high-level active waste assay (leached hulls, high level liquid waste, etc.).

Other NDA activities will be defined, as appropriate, upon completion of these activities.

D. Fiscal Management

The activities carried out by DOE and JAERI will be funded and managed by each respective organization. No exchange of funds is anticipated at this time.

Approvals:

For the Japan Atomic Energy Research Institute

Signature: Koji Ikawa

Printed Name: Koji Ikawa

Title: Head, Safeguards Tech. Lab.

Date: March 10, 1995

For the United States Department of Energy

Signature: Kenneth E. Sanders

Printed Name: Kenneth E. Sanders

Title: Director International Safeguards Division

Date: 24 March 1995

APPENDIX I

DOE/JAERI Action Sheet 7

Study of Design and Evaluation of Near-Real-Time Accounting System

Provisional Schedule of Activities

Activity	Responsibility	Schedule/Status
1. Project Start	LANL/JAERI	December 1993
2. Define a selected facility for the study	JAERI	July 1994
3. Comprehensive discussion and review of relevant NRTA Documents	LANL/JAERI	August 1994
4. Transfer variance propagation software to JAERI	LANL	March 1995
5. Modeling selected nuclear facilities and their NRTA system	LANL/JAERI	June 1995
6. Comparative study of methods for detecting anomalies in NRTA data	LANL/JAERI	September 1995
7. Preparation of a joint report	LANL/JAERI	December 1995
8. Completion of Project		December 1995