ACTION SHEET 42

between

The Japan Nuclear Cycle Development Institute (JNC))
And
The United States Department of Energy (DOE)
For
Investigation of Measurement Methods for Scrap Materials with High Impurities

1. Introduction

Under Article I (Objective) of the Agreement between JNC and DOE for Cooperation in Research and Development Concerning Nuclear Material Control and Accounting Measures for Safeguards and Nonproliferation (herein called the "Agreement"), dated January 27, 2000, DOE and JNC undertake to carry out a joint study of safeguards system for dry reprocessing methods. The Action Sheet takes into consideration aspects of the IAEA Strengthened Safeguards System (SSS). Incorporating remote monitoring capabilities is a component of the SSS.

2. Scope of Work

This action sheet provides for studying and evaluating NDA methods that could be used to measure impure plutonium scrap and waste prior to chemical recovery. The waste requires measurements for routine inspection purposes and for accountability in the scrap recovery process.

Sample specifications and facility specific constraints will be obtained from PPFF, and JNC will be consulted to establish measurement objectives and preferred approaches. New measurement methods and hardware will be evaluated including calorimetry, the "known M" technique, multiplicity counting, using the plutonium scrap multiplicity counter (PSMC) and the epithermal neutron multiplicity counter (ENMC), and the dual-time measurement (DTM) approach. The prototype ENMC will be field tested at PPFF on target scrap material for direct comparison with the PSMC to provide quantitative data on relative errors, robustness, and reliability. This prototype test will be a joint activity between LANL and JNC. Software options including unattended operation and authentication will be evaluated. The NDA options will be evaluated and a joint decision with JNC will be made to select the preferred option. Hardware and software for an in-plant scrap measurement system would be considered as part of a new action sheet (Phase-II).

The work performed under this AS shall be performed at the Los Alamos National Laboratory (LANL) and JNC in accordance with the terms and conditions of the Agreement.

3. Program Management

LANL is responsible for evaluating the hardware and software options for measuring high impurity scrap materials and for reporting the results of the evaluation to JNC. JNC is responsible for providing information on sample specifications and facility constraints

required for the studies and for providing representative scrap materials that can be measured during field test evaluations. The work to be done is identified in Appendix I and is limited to techniques for safeguards applications.

Appendix II identifies key personnel working on this project.

DOE and LANL shall work directly with JNC in planning tasks and resolving programmatic and technical questions. LANL shall start by developing and circulating a work plan with projected milestones for each task and update the work plan with JNC concurrence as work progresses.

LANL shall prepare informal reports on the task and circulate them to JNC, DOE, and other pertinent organizations as requested by JNC.

LANL and JNC shall prepare and present written and oral reports at meetings of the Permanent Coordinating Group.

4. Fiscal Management

JNC shall make a cash contribution with the sum of $100,000 in United States dollars to conduct the activities related to the completion of the investigation as defined in Appendix I of this Action Sheet in the following manner:

> A contribution of $100,000 in United States dollars shall be due and payable upon receipt of an invoice to be issued in April 1999. This payment is subject to approval and appropriation of necessary funding by the Japanese Government for JFY 1999.

All contributions by JNC shall be due and payable within thirty days of JNC receipt of an invoice from DOE, subject to availability of appropriated funds to JNC.

DOE shall be responsible for the budget planning and financial management and shall make best efforts to complete the JNC-funded activities in the Appendix I satisfactorily and within the cash contribution by JNC. DOE costs are determined in accordance with DOE's policy for costing work it performs for others as set forth in 10 CFR Part 1009. The total cost to JNC for DOE's performance of work under this Action Sheet shall not, without JNC's prior consent, exceed the contributions set forth above.

DOE shall not begin or carry out work prior to entry into force of the Agreement and Action Sheet and receipt of the required payment in advance. Work shall not be continued after funds from JNC have been depleted.

Throughout the duration of work under this Action Sheet, JNC shall provide sufficient funds in advance to reimburse DOE for causing LANL to perform the work described in this Action Sheet, and DOE shall have no obligation to perform in the absence of adequate advance funds. Payment in advance from JNC shall be sufficient to cover the expected obligation and cash requirements of the work until a subsequent request for payment in advance can be made, collected, and recorded. In this regard, sufficient advance funds shall be provided to maintain, at a minimum, a continuous 90-days advance of funds for expected

DOE fund requirements during the life of this Action Sheet. Advances shall be sufficient to cover expected termination costs that DOE would incur on behalf of JNC.

5. Duration and Termination

This Action Sheet shall enter into force upon the later date of signature and shall continue in force for an 18-month period or until mutually agreed by the parties that all activities under this Action Sheet are completed.

For the Japan Nuclear Cycle Development Institute

Signature: Masayuki Iwanaga

Printed
Name: Masayuki Iwanaga

Title: Director
International Cooperation and Nuclear Material Control Division

Date: 27 January 2000

For the United States Department of Energy

Signature: Kenneth E. Sanders

Printed
Name: Kenneth E. Sanders

Title: Director
International Safeguards Division

Date: 27 January 2000

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APPENDIX I

Investigation of Measurement Methods for Scrap Materials with High Impurities

1. Study Outline

This action sheet involves the evaluation of NDA systems for impure plutonium at PPFF. The study outline is as follows:

A. Obtain sample specifications and facility constraints from JNC.
B. Evaluate NDA measurement approaches for the scrap and waste including:
   - calorimetry
   - "known M" analysis via MCNP or add-a-source
   - plutonium scrap multiplicity counting (PSMC)
   - epi-thermal neutron multiplicity counting (ENMC)
   - dual time measurement (DTM) approach
C. Field test the prototype ENMC and the PSMC at PPFF using actual scrap materials.
D. Provide JNC with documentation on the in-plant tests.
E. Evaluate software options and authentication requirements for the different NDA approaches.
F. Jointly review the NDA options with JNC and recommend a preferred approach.
G. Provide JNC with a summary report on the study and conclusions.

2 . Sites

This work will be conducted at:

Los Alamos National Laboratory Los Alamos, New Mexico, USA	and	Japan Nuclear Cycle Development Institute Tokai, Japan

3. Programmatic Responsibilities

A. LANL will be responsible for providing best efforts within the funding and schedule for the NDA methods evaluation. Any tests or technical assistance shall be provided on a non-interference basis with existing LANL programs

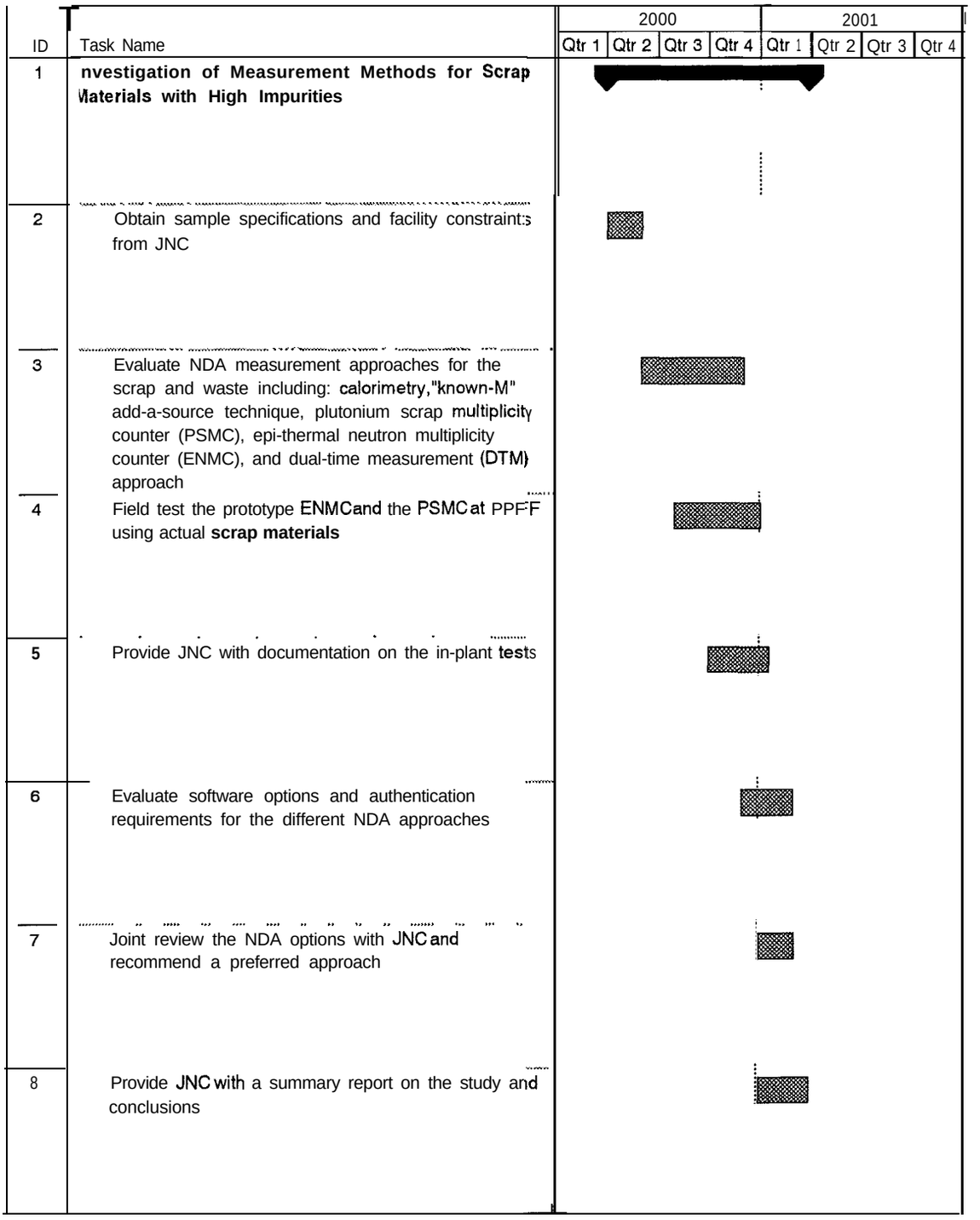
B. JNC will be responsible for providing information on sample specifications and facility constraints.

C. LANL and JNC will jointly participate in technical meetings and report preparation.

As more detailed program plans are developed, specific responsibilities will be better defined and delineated.

4. Schedule

The schedule will be followed on a best-effort basis commencing on receipt of funding and availability of parts.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1
nvestigation of Measurement Methods for Scrap Materials with High Impurities
2
Obtain sample specifications and facility constraints from JNC
3
Evaluate NDA measurement approaches for the scrap and waste including: calorimetry, "known-M" add-a-source technique, plutonium scrap multiplicity counter (PSMC), epi-thermal neutron multiplicity counter (ENMC), and dual-time measurement (DTM) approach
4
Field test the prototype ENMC and the PSMC at PPFF using actual scrap materials
5
Provide JNC with documentation on the in-plant tests
6
Evaluate software options and authentication requirements for the different NDA approaches
7
Joint review the NDA options with JNC and recommend a preferred approach
8
Provide JNC with a summary report on the study and conclusions

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APPENDIX II

Key Personnel

Investigation of Measurement Methods for Scrap Materials with High Impurities

Japan Nuclear Cycle Development Institute

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