

**ACTION SHEET 39**  
**between**  
**The United States Department of Energy (DOE)**  
**and**  
**The Japan Nuclear Cycle Development Institute (JNC)**  
**for**  
**Development of Radiation Sensor Monitors to Improve Dual C/S at Monju Reactor Core**

1. Introduction

Under Article II (Area of Cooperation) 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 September 15, 1993, DOE and JNC undertake to study, develop and install neutron detection sensors to be implemented as a component of a dual containment and surveillance system on the Monju reactor core.

2. Scope of Work

This Action Sheet (AS) provides for developing radiation detector sensors that will be used for monitoring fuel movement above the Monju reactor core. Electronics, computers, and software with IAEA authentication will be provided to support the system. Information from the system will be used for containment and surveillance purposes to provide the IAEA with improved dual C/S capabilities at the facility.

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

3. Program Management

LANL is responsible for developing and installing a radiation detector system to monitor fuel movement in locations around the Monju reactor core. The work to be done is identified in Appendix I and is limited to development of equipment and techniques for nuclear safeguards application. JNC is responsible for providing design information, operating data, any other information, and facilities needed for completion of the development and installation of the radiation monitoring systems

Appendix II identifies key personnel associated with 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 and shall update the work plan with JNC concurrence as work progresses.

LANL shall prepare brief semiannual letter progress reports on each 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 (PCG).

#### 4. Fiscal Management

JNC shall make a cash contribution with the sum of \$330,000 in United States dollars to conduct the activities related to the completion of joint studies into safeguards techniques as defined in Appendix I of this Action Sheet in the following manner:

- a.) A contribution of \$50,000 in United States dollars shall be due and payable upon receipt of an invoice to be issued in Japanese Fiscal Year (JFY) 1998 after the date of signature of the Action Sheet.
- b.) A contribution of \$150,000 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 the appropriation of necessary funding by the Japanese Government for JFY 1999.
- c.) A contribution of \$130,000 in United States dollars shall be due and payable upon receipt of an invoice to be issued in April 2000. This payment is subject to approval and the appropriation of necessary funding by the Japanese Government for JFY 2000.

All contributions by JNC shall be due and payable within thirty days of receipt by JNC 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 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 a three-year period or until mutually agreed by the parties that all activities under this Action Sheet are completed.

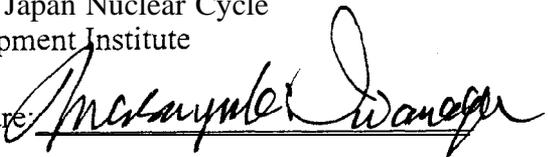
For the United States Department of Energy

Signature: 

Printed  
Name: Kenneth E. Sanders  
Title: Director  
International Safeguards Division

Date: 1-15-99

For the Japan Nuclear Cycle  
Development Institute

Signature: 

Printed  
Name: Masayuki Iwanaga  
Title: Director  
International Cooperation and  
Nuclear Material Control Division

Date: March 12, 1999

**ACTION SHEET 39**  
**APPENDIX I**

**Development of Radiation Sensor Monitors to Improve Dual C/S at Monju Reactor Core**

1. Study Outline

This program involves studying the radiation signatures around the Monju core, developing two neutron detector sensors and installing the sensors. The system will improve the dual containment and surveillance capabilities at the Monju facility. The study outline is as follows:

- A. JNC will provide site-specific design information
- B. LANL will do a feasibility study of monitoring and data transmission methods to be used at Monju.
- C. LANL will design the hardware and software for the neutron sensors
- D. JNC will review the system design prepared by LANL.
- E. LANL will develop the hardware and software for the system.
- F. LANL and JNC will do functionality tests on the system at LANL.
- G. LANL and JNC will install the system at Monju
- H. LANL, JNC, IAEA, and JAEB will perform an acceptance test on the system.
- I. LANL will provide a set of documentation required by the IAEA.

As more detailed program plans are developed, specific responsibilities will be better defined and delineated. The monitoring system hardware and software will be designed to be compatible with the overall integrated monitoring system at Monju.

2. Sites

This work will be conducted at:

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

3. Programmatic Responsibilities

- A. LANL will be responsible for providing best efforts within the funding and schedule for the feasibility study and for the detector development.
- B. JNC will be responsible for providing facility specifications and information on any constraints
- C. JNC and LANL will jointly participate in the detector installation and testing.
- D. JNC and LANL will jointly participate in technical review meetings and the final evaluation.

4. Schedule

The schedule will be followed on a best-effort basis commencing on receipt of funding and availability of parts.

ID	Task Name	1998			1999				2000				Qtr
		Qtr 1	Qtr 2	Qtr 3	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	
1	<b>Development of Radiation Sensor Monitors to Enhance Dual C/S at the Monju Reactor Core</b>												
2	JNC provides site-specific design information												
3	Feasibility study of the monitoring and data transmission methods to be used at the Monju												
4	Design of hardware and software for the neutron sensor system.												
5	Review of system design												
6	Development of hardware and software for the system.												
7	Functional tests on system.												
8	System installation at Monju.												
9	Acceptance tests at Monju												
10	Documentation and reporting												

## ACTION SHEET 39

### APPENDIX II

#### Development of Radiation Sensor Monitors to Improve Duai C/S at Monju Reactor Core

##### Japan Nuclear Cycle Development Institute

###### ***JNC Headquarters***

*Keiichiro Hori*, Group Leader  
Safeguards Co-ordination and Management  
Group  
International Cooperation and  
Nuclear Material Control Division  
Japan Nuclear Cycle Development Institute  
4-49 Muramatsu Tokai-mura,  
Ibaraki-ken  
JAPAN Post No. 3 19-1 184

*Takeshi Kawamura*, General Manager  
International Cooperation Section  
International Cooperation and  
Nuclear Material Control Division  
Japan Nuclear Cycle Development Institute  
4-49 Muramatsu Tokai-mura,  
Ibaraki-ken  
JAPAN Post No. 3 19-1 184

###### ***Monju Reactor***

*Takehide Deshimaru*, General Manager  
Reactor and Systems Engineering Section  
Monju Construction Office  
Japan Nuclear Cycle Development Institute  
2-1, Shiraki, Tsuruga-city Fukui-ken  
JAPAN Post No. 919-1279

##### Department of Energy

*Kenneth Sanders*, Director  
International Safeguards Division  
Office of Arms Control and  
Nonproliferation (N-N-44, GA045)  
Department of Energy  
1000 Independence Ave., SW  
Washington, DC 20585

*James Busse*  
International Safeguards Division  
Office of Arms Control and  
Nonproliferation (NN-44, GA045)  
Department of Energy  
1000 Independence Ave., SW  
Washington, DC 20585

*John Cappis*  
International Safeguards Division  
Office of Arms Control and  
Nonproliferation (NN-44, GA045)  
Department of Energy  
1000 Independence Ave., SW  
Washington, DC 20585

**DOE-Albuquerque Operations Office**

*James R. Anderson*, Director  
Science and Technology Transfer Division  
DOE/Albuquerque Operations Office  
P.O. Box 5400  
Albuquerque, NM 87 115

**Los Alamos National Laboratory**

*Mark Abhold*  
Group NIS-5, MS E540  
Los Alamos National Laboratory  
Los Alamos, NM 87535

*George W. Eccleston*  
Group NIS-7, MS E550  
Los Alamos National Laboratory  
Los Alamos, NM 87545

*Gerald E. Bosler*  
Group NIS-7, MS E541  
Los Alamos National Laboratory  
Los Alamos, NM 87545