

Summary

1. Overview of the Reviewed Facility

The Japan Nuclear Technology Institute (JANTI) conducted a peer review (Review) of business in "Uranium Enrichment" and "Low-Level Radioactive Waste Disposal" of Japan Nuclear Fuel Limited (JNFL) from Monday, July 27, to Tuesday, August 4, 2009.

JNFL is doing business in "uranium enrichment", "low-level radioactive waste disposal", "temporary storage of high-level radioactive waste", and "reprocessing of spent fuel" in Rokkasho-mura, Kamikita-gun, Aomori Prefecture. At the present time, some portion of "uranium enrichment", "low-level radioactive waste disposal", and "temporary storage of high-level radioactive waste", are under operation, where as "reprocessing of spent fuel" is under commissioning and expected to be completed in 2010.

The scope of this review is the activities currently under operation of "uranium enrichment" and "low-level radioactive waste disposal". "Development and operation of a new type uranium enrichment centrifuge" and "low-level radioactive waste disposal for the next term", which are under planning, were not subject to this review.

In this report, Uranium Enrichment Plant and administrative departments of enrichment business including Enrichment Planning Department and Safety Control Department are collectively referred to as "Enrichment Business Division". In addition, Low-Level Radioactive Waste Disposal Center and administrative departments of disposal business including Radioactive Waste Disposal Planning Department and Safety Control Department are collectively referred to as "Disposal Business Division".

At the present time, JNFL adopted centrifugal separation technology for uranium enrichment developed by Power Reactor and Nuclear Fuel Development Corporation (present Japan Atomic Energy Agency). The current capacity of the facility is 1,050 tons SWU per year. There are two production lines, RE-1 and RE-2, however, at the present time, only RE-2B is in operation.

Table 1: Operation Status of Enrichment Facility

Production Line	Operating Line	Operation Commenced	Status of Operation
RE-1	RE-1A	March 1992	Suspended
	RE-1B	December 1992	Suspended
	RE-1C	May 1993	Suspended
	RE-1D	September 1994	Suspended
RE-2	RE-2A	October 1997	Suspended
	RE-2B	April 1998	In operation
	RE-2C	October 1998	Suspended
Total	1,050 tons SWU/year	-	-

Approximately 250 personnel are employed at the enrichment plant, or about 150 excluding those engaged in development and production of the new type centrifuge.

Disposal Business Division lays underground the low-level radioactive waste generated at nuclear power stations. In No. 1 Disposal Facility, concentrated liquid waste and spent resin solidified with cement or plastic in drums is laid. In No. 2 Disposal Facility, solid waste including metals and plastics, which are separated from others, and cut up, compressed, melted as necessary, then put into drums and solidified with mortar in drums is laid.

Table 2: Operation Status of Disposal Facility

Facility	No. 1 Disposal Facility	No. 1 Disposal Facility
Capacity (200-liter drums equivalent)	200,000 drums	200,000 drums
In storage (as of June 30, 2009)	141,115 drums	71,016 drums
Operation Commencement	December 1992	October 2000

Approximately 100 personnel are employed by Disposal Business Division, or about 60 excluding those engaged in the disposal facility for the next term.

2. Review schedule

After the reviewer training and preparation at JANTI office from Wednesday, July 22nd to Friday, July 4th, 2009, the Review was conducted at the facility for nine days from Monday, July 27th to Tuesday, August 4th, as shown in Table 3.

Prior to the Review, field observations were conducted to observe field works at the facility for the three days from Monday, July 13th to Wednesday, July 15th, 2009 (work observations).

Table 1: Review schedule at the Station

		Review Description
Jul. 27th (Mon)	(Morning)	· Entrance meeting (introduction of review team, review plan, etc.)
	(Afternoon)	· Observation of plant equipment conditions, etc. · Schedule arrangement with the station counterpart in each review area
28th (Tue) 29th (Wed)		· Observation of plant equipment conditions, field observations, interviews, document reviews and discussions about these results with counterparts. · Team meeting including JNFL representatives
30th (Thu) 31th (Fri)		· Field observations, interviews, document reviews and discussion about these results with station counterparts. · Discussion among exit representative, team leader and JNFL representatives on the progress of Review · Team meeting including JNFL representatives
Aug. 1st (Sat)		· Team meeting (refine strengths and areas for improvement)
2nd (Sun)		· Day Off
3rd (Mon)		· Discussion on causes and contributors related to problem areas with counterpart · Discussion between team leader and JNFL representatives regarding strengths and areas for improvement · Team meeting including JNFL representatives
4th (Tue)	(Morning)	· Review and finalization of strengths and areas for improvement · Discussion among exit representative, team leader and JNFL representatives on strengths and areas for improvement · Compile material for exit meeting
	(Afternoon)	· Exit meeting (explanation from review team regarding strengths and areas for improvement, as well as supplementary explanations when requested by JNFL)
5th (Wed)	(Morning)	· Press conference organized by JANTI

3. Review methodology and review scope

The objective of the Review conducted by JANTI is to promote further improvements in the safety and reliability of the nuclear facilities. In addition, sharing strengths with nuclear industry as assistance is the purpose as well.

3.1 Review methodology

The Performance Objectives and Criteria (PO&C) used by WANO^{*1} (World Association of Nuclear Operators) were applied to the Review as a standard. This standard was formulated as a guideline to promote the highest level of the performance of nuclear power plant operations. In the review, the PO&C was applied to identify "strengths" and "areas for improvement (AFIs)".

Strengths are items which have been judged to have reached the highest level possible. On the other hand, AFIs are items for which effort is required to reach the highest level possible, but does not always mean insufficient, inadequate or poor performance compared with industry standards.

The facility performance in around April 2006 or later was determined to be reviewed. The review team conducted the Review as described below, focusing on field observations and closely discussing with facility counterparts in accordance with INPO^{*2} (Institute of Nuclear Power Operations) and WANO review methodology.

- *1) WANO was founded in 1989 by nuclear operators world-wide, after the 1986 accident at the Chernobyl Nuclear Power Plant made it painfully clear that a global information network of nuclear power utilities was needed. Its mission is to improve the operational safety and reliability of nuclear power stations to the greatest extent possible, by implementing a variety of support activities for nuclear power stations. These include reviews of nuclear power stations throughout the world, as well as exchanging information concerning accidents and problematic events.
- *2) INPO was established by the US nuclear power industry after the 1979 accident at Three Mile Island nuclear power station. Regular review of US nuclear power stations is one of INPO's principal activities, and these are mainly accomplished by staying at the nuclear power station for two weeks and conduct on-site observations. The JANTI review follows this method. Since 1990, the contributions of INPO are recognized as being among the most extensive from those involved with nuclear power in improving safety and reliability at US nuclear power stations.

3.1.1 Information gathering and analysis

Reviewers for each area analyzed the information provided by the facility in advance, which included: in-house operating experiences, procedures, meeting minutes, and work observations developed by JANTI. This is in order to prepare a review plan for effective implementation of Review at the facility.

3.1.2 Observations of equipment and facility conditions at the facility

First of all at the facility, all reviewers conducted plant inspection and observed equipment conditions in the area assigned to each of them and noted any issues noticed. The number of collected issues at enrichment facility was 74 in total. When sorted by appropriate review area, there were, approximately, 30 issues in operations, 40 issues in

maintenance, ten issues in engineering support, and five issues in radiation protection. The number of collected issues at disposal facility was 26 in total. When sorted by appropriate review area, there were, approximately, ten issues in operations, ten issues in maintenance, five issues in engineering support, and five issues in radiation protection. Each reviewer utilized these records as material to understand the current situation of the facility for the subsequent review.

Since the content of many items falls under several categories, the sum of all categories is greater than the total number of items.

3.1.3 Field observations and follow-up

Following the observation of equipment conditions, the reviewers assigned to the specific review area started observations of the condition of the facilities and equipment, and performance and behaviour of facility personnel including contractor employees from a point of view of expert. Then, they made interviews and reviewed documentation to follow-up the results obtained through detailed observations. Each reviewer decided whether the gathered information was significant or not based on the review standard (PO&C) and his/her own practical experience. The significant facts identified as beneficial or problematic were recorded and noted as the issues need further evaluation. Each reviewer exchanged opinions about these facts with the counterpart and, if necessary, employees of contractors over and over.

The results of the aforementioned were presented at the evening review team meeting, and matters considered as excellent or problematic were deliberated by all members of the team.

Immediately prior to the review period, JNFL announced the following two minor events. JNFL had not completed its investigations into the causes and measures of the two events, however, the state of the investigation was interviewed and used as reference of Review.

- (1) On Wednesday, June 24, when the temporary lid was removed for the preparations to place a porous concrete plate at No. 1 Disposal Facility, it was found that one portion of waste (drum) was partially sticking out through the surface of the mortar filling.
- (2) On Thursday, July 16, one contractor worker mistakenly entered the radiation controlled area without his personal dosimeter for periodic inspection of building utility equipment in the low-level waste control building. The cause of the event was that the worker left his personal dosimeter on the top of the access control apparatus for clearance of entry/exit to the building when entering the radiation controlled area.

3.1.4 Analysis of observation results

Reviewers for each area identified the excellent points and problematic issues according to the review standard (PO&C) from among matters gathered through the processes listed in 3.1.1, 3.1.2, and 3.1.3.

The excellent points were consolidated as "strengths," and information about them was included so that other facilities may use them as reference.

The problematic issues were further analyzed to clarify what the problem nature was, why they occurred (causes and contributors), and how they could be solved (how to make improvement). In cases where additional information was required for this work process,

additional field observations, document reviews, or interviews were conducted once more, and AFIs were developed based on the results.

AFIs including their nature, causes and contributors were presented to the counterparts with reference to the PO&C and actual industry best practices. Discussions were repeated until a mutual understanding about the nature of the problem, the causes, and the background.

The details of these discussions and feedbacks from facility personnel were presented again at the review team meeting. All of review team member made further discussion and analysis in order to brush up strengths and AFIs in terms of accuracy and appropriateness from multiple perspectives considering the feedback.

3.2 Review Scope

3.2.1 Review Areas

In the review, six functional areas listed in (1) through (6) below were reviewed. Operations of Disposal Business Division was reviewed by the maintenance reviewers. Engineering support and operating experience were reviewed by the same reviewers. (7) through (10) areas were reviewed as required as part of six functional areas.

- | | |
|--|---------------------------------|
| (1) Organization and administration | (2) Operations |
| (3) Maintenance | (4) Engineering support |
| (5) Radiological Protection | (6) Operating Experience |
| (7) Chemistry | (8) Training |
| (9) Fire Protection | (10) Emergency Preparedness |

3.2.2 Review Team Composition

The review team consists of:

Exit Representative: Okuno, Technical Advisor of JANTI

Team Leader: Kawashima, Director of JANTI

Team Members: 12 members excluding Exit Representative and Team Leader
(2 JANTI member organization personnel; 10 JANTI personnel)

4. Summary of results

The following strengths and AFI were identified.

4.1 Strengths

The following four strengths were identified.

[Operations]

(1) [Enrichment]

Engineering of Enrichment Business Division manages various analysis technologies involving uranium hexafluoride by itself, thereby preserving, enhancing, improving, and transmitting the skills that are useful in the processing of waste. Furthermore, from the perspective of maintaining traceability, it also endeavours to raise the level of objectivity and reliability of analysis results by making use of standard liquid solutions produced by certified overseas makers.

[Engineering Support]

(2) [Disposal]

At every step including the construction of waste disposal pits, placement of wastes, and the covering with concrete, measures taken for preventing rainwater from seeping into the pit. In addition, from the completion of the pit to the backfill of the pit, a wide variety of efforts in design, construction management, and maintenance management are made in order to prevent rainwater from permeating through fissures. Thus every measure is taken to maintain flawless integrity of the disposal facility.

[Radiological Protection]

(3) [Enrichment]

In addition to the utmost efforts to reduce radioactive solid wastes, from the time the waste is generated until it is put into storage, classification of the waste is stringently carried out. Measures are also put into effect to prevent the spread of contamination from the contaminated waste. For example, as a means of reducing the generation of waste, following policies are put into practice: "Do not bring anything into the work area unless it is required for the job" "Bring in only the minimum amount of consumables if necessary" "Re-use any uncontaminated usable items"

[Organization and Administration]

(4) [Enrichment]

Training and passing down of enrichment technology applies not only to JNFL personnel, but it is also implemented enthusiastically for contractors. For instance, the engineering know-how for operations is reflected in the operation manuals and JNFL employees read through the procedures together with contractor personnel before commencing the operation, and the operation is carried out in accordance with the procedures. In this way, all know-how is passed on.

4.2 Areas for improvement

The following 10 areas for improvement were identified.

The order of importance of areas for improvement suggestions are "improvement is needed", "improvement is desired", or "there is room for improvement."

[Operations]

(1) [Enrichment]

There are some inadequacies in the use of human error prevention tools (pointing and calling, procedure adherence, peer checking) and checking the state of operation, thus there is room for improvement. For instance, when switching over the exhaust blowers,

operators were seen performing a series of steps without confirming check sheets for step by step.

[Maintenance]

(2) [Enrichment]

Inappropriate work practices by maintenance workers were seen such as the failure to adequately use human error prevention tools, thus there is room for improvement. For instance, when calibrating a pressure gauge, when a data scribe wrote down the data read off by the site foreman without repeating back the data for confirmation.

(3) [Disposal]

Some inadequacies were seen regarding the reinforcement of using human error prevention tools in operations and in maintenance, thus there is room for improvement. For instance, pointing and calling was not carried out adequately when operators pressed buttons on the control panel to transport wastes.

[Engineering Support]

(4) [Enrichment]

Some inadequacies were seen in the reduction of combustibles and measures when using fire in the field, thus there is room for improvement. For instance, some cardboard boxes were observed in the permanent storage area near a diesel generator, which was under maintenance.

[Radiological Protection]

(5) [Enrichment & Disposal]

There are some inadequacies in contamination control for articles carried out from controlled areas and the designation of contamination controlled areas within radiation controlled areas, thus there is room for improvement. For instance, rather complex shaped items such as electric drills were taken out of the radiation controlled area after checking for contamination with a survey meter only.

[Operating Experience]

(6) [Enrichment]

Operating experience data is not always collected or analyzed systematically, thus there is room for improvement. For instance, collection, analysis and use of near miss events is done by operations only. There are no systematic activities throughout the facility in collection of the near miss events.

(7) [Disposal]

Operating experience is not necessarily widely used, thus improvement is desired. For instance, operating experience was not always discussed prior to work, or described in procedures to show workers the matters to pay attention.

[Organization and Administration]

(8) [Enrichment]

In the areas of operations, maintenance, fire protection and radiological protection of Enrichment Business Division, expectations on fundamental behaviours are not necessarily set or reinforced among facility personnel and contractors. Improvement is desired since the management of Enrichment Business does not fully set clear expectations in these areas. In addition, the management does not appropriately monitor and observe the operations of the facility or correct its issues. In maintenance area, for instance, expectations on appropriate work practices for maintenance supervisors or field workers are not set, and some instances were observed where appropriate work practices were not reinforced.

(9) [Enrichment & Disposal]

Based on investigations into the attitudes toward promoting safety culture through interviews with facility personnel and contractor personnel, it was found that common understanding as an organization is still lacking in substance and its benefits can not be reaped, thus there is room for improvement in this regard. For instance, it was observed that documents on safety culture are not adequately studied as an organization.

(10) [Disposal]

Some inappropriate work practices were observed in the field. There is room for improvement in raising the level of industrial safety. For instance, while a crane was being inspected, rigging equipments were observed that had proper labels showing inspection result.