



## **Further activities of Safety Culture toward nuclear transportation industry**

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### **1. Purpose of NSnet and background**

On September 30, 1999, a criticality accident occurred at the uranium processing facility of the JCO Co. Ltd. (hereinafter referred to as "JCO") Tokai plant, located in Tokaimura, Ibaraki Prefecture.

This was an unprecedented accident in Japan's history of peaceful use of nuclear power, resulting in three workers exposed to severe radiation, two of whom died, and the evacuation and enforced indoor confinement of local residents.

Nuclear power suppliers must take personal responsibility for ensuring safety. In this connection, the electric power industry, heavy electric machinery manufacturers, fuel fabricators, and nuclear power research organizations gathered together to establish the Nuclear Safety Network (NSnet) in December 1999, based on the resolve to share and improve the level of the safety culture across the entire nuclear power industry and to assure that such an accident never occurs again.

NSnet serves as a link between nuclear power enterprises, research organizations, and other bodies, based on the principles of equality and reciprocity. A variety of activities are pursued, such as diffusing a safety culture, implementing mutual evaluation among members, and exchanging safety-related information.

Aiming to share and improve the safety culture throughout the entire nuclear power industry, NSnet thoroughly implements the principle of safety first, while at the same time making efforts to restore trust in nuclear power.

NSnet is currently composed of a total of 36 member companies, including electric power companies, plant manufacturers, fuel fabricators, and research organizations. A major feature of NSnet is that it is an organization that transverses the nuclear power industrial world, involving not only the suppliers that comprise the nuclear fuel cycle, but also the supporting companies and research organizations (see Figure 1).

These 36 members include 11 power companies, which own nuclear power stations and nuclear power station construction plans; Nuclear Fuel Transport Co., Ltd., which transports spent fuel, low-level radioactive waste, and other material; plant manufacturers; fuel fabricators; and Kobe Steel, Ltd., Hitachi Zosen Corporation and Mitsui Engineering & Shipbuilding Co., Ltd., which manufacture casks (see Table 1).

### **2. NSnet activities**

#### **(1) Diffusing a nuclear safety culture**

In order to thoroughly implement the principle of safety first and to share and improve the safety culture among

members, NSnet holds seminars for the management and managers of the members, under themes related to nuclear safety. NSnet also organizes "Safety Caravans" that visit the member facilities to offer lectures and exchange information and opinions on safety management activities at member facilities.

The details on seminars are as follows.

(1) Top Seminars are held once a year, in the form of safety culture-related lectures, for the management of member companies and the superintendent class of the facilities. A total of four Top Seminars have been held.

(2) Managers' Seminars are held once to twice a year for the manager class of member facilities, and introduce progressive efforts in safety management activities, safety management activities of the member companies, good practices, and examples of failures. A total of eight Managers' Seminars have been held.

(3) NSnet Seminars are held once a year, in the form of nuclear safety-related lectures and panel discussions, for the executives and presidents of members and related companies and the general public. A total of four NSnet Seminars have been held.

The morning session of Safety Caravans involve an introduction of NSnet activities and safety lectures related to safety culture and concrete safety management activities. The afternoon session involves the exchange of information and opinions regarding safety management activities and introduces good practices. As of the end of July 2004, 63 facilities have been visited and approximately 5,700 people, including employees from member facilities and related companies, have participated in the safety lectures.

FY2003 narrowed down the safety lecture themes to corporate ethics and engineer ethics, in response to the improper handling of data from the voluntary inspection of nuclear power stations that was revealed in August 2002.

In addition, the knowledge gained from the various activities is summarized in pamphlets, which are distributed to members and used to foster a safety culture.

## **(2) Mutual evaluation among members (Peer Review)**

The purpose of the Peer Review is to thoroughly implement a safety awareness throughout the entire nuclear power industry and to share and improve the safety culture. The review team, composed of member experts, visits member facilities to investigate and evaluate the various nuclear safety-related activities, and extracts matters that should be improved and those that should be horizontally developed, in the attempt to mutually share the held knowledge.

The facilities that handle nuclear fuel material are evaluated under six categories, such as organization and administration, emergency measures, education and training, operation and maintenance, radiation protection, and important issue response, through document confirmations, on-site confirmations, and personnel interviews.

One team is composed of two persons, with three teams involved. The form of this evaluation differs depending

on the facilities, with 3.5 days required for the evaluation.

For facilities that do not handle nuclear fuel material, such as facilities that design and manufacture casks, the evaluation does not include the emergency measures and radiation protection categories.

One review team is composed of two persons, with two teams involved, or a total of four persons.

The evaluation of these types of facilities requires 2.5 days.

If necessary, observers also participate in the document investigation, on-site investigation, and personnel interviews, in the effort to improve the quality of the review and maintain objectivity.

The results of the Peer Reviews are summarized into a report approximately one month after the review.

These results are submitted to the top management of the subject member companies, and at the same time are posted on the NSnet website and thus disclosed to the public.

Since October 2002, in response to the improper handling of data from the voluntary inspection of nuclear power stations, Peer Reviews have been conducted with a focus on building an ethics program, building a system and climate that responds to internal voices, and building a system that prevents the falsification of data.

As of June 2004, Peer Reviews have been conducted at 40 facilities. These Peer Reviews did not find, in terms of nuclear safety at these facilities, any items that had the possibility of linking to serious accidents if improvement action was not taken immediately. There are a total of 622 extracted good practices and a total of 199 improvement proposals, which are being shared and horizontally developed between members to aid in thoroughly implementing a safety awareness throughout the entire nuclear power industry and fostering a safety culture.

The performance from Peer Reviews on transport-related companies is shown below.

Implemented year	Company name	Facilities name	Business overview	Good practices (number of cases)	Improvement proposals (number of cases)
December 2002	Nuclear Fuel Transport Co., Ltd.	Head Office and the Rokkasho Transport Operations Office	Transport of spent fuel, low-level radioactive waste, vitrified waste, and natural uranium hexafluoride	14	7
February 2003	Mitsui Engineering & Shipbuilding Co., Ltd.	Tamano Works	Design and manufacture of casks	14	3

May 2003	Hitachi Zosen Corporation	Ariake Machinery Works	Design and manufacture of casks	13	4
June 2003	Kobe Steel, Ltd.	Takasago Equipment Plant	Design and manufacture of casks	11	5

From the fact that Nuclear Fuel Transport Co., Ltd. is pursuing a consistent system and effort toward safety management of transport overall, the Peer Review targeted not only the on-site facilities, but also the efforts toward nuclear safety across the transport management business overall, including design management. For this reason, the on-site facilities required one day and the Head Office 2.5 days for a review of five areas: organization and administration; emergency measures; education and training; design, transport, and maintenance management; and important issue response.

The reviews of the other three companies focused on the nuclear safety-related activities pursued in the design and manufacture stages so as to enable the casks to possess and demonstrate the functions required in terms of nuclear safety in design and manufacturing. These reviews were based under four areas, in other words organization and administration, education and training, design and manufacture, and important issue response, and were conducted over 2.5 days.

Attention is given to ethics, communication, and data handling when conducting the reviews, in consideration of the 1998 falsification of the data on the neutron shielding material (resin) for the spent fuel transportation casks and the 2002 falsification of data from the voluntary inspection of nuclear power stations.

### **(3) Disseminating nuclear safety information**

A website has been launched for members in order to provide useful information for safety management to members. Specifically, the website posts the following: seminar and Safety Caravan performance as well as those lecture proceedings, and documents related to fostering a safety culture, as information related to the diffusion of nuclear safety culture; Peer Review reports and a good practice and improvement proposal database, as information related to Peer Reviews between members; trouble information on member facilities, press reports, and human factor documents, as information related to the exchange and dissemination of nuclear safety-related information; and Council Meeting reports and the schedule of NSnet activities, as other information.

In addition, a website has been launched for the general public, in order to introduce to the public an overview of NSnet such as the establishment purpose, organization, and directors, the results of the various activities such as the Peer Review, Safety Caravan, and seminars, and the member facilities and their operation statuses.

An English version website has also been launched so as to introduce the status of NSnet activities and the member facilities to people overseas.

NSnet delivers an e-mail newsletter in both Japanese and English, as a form of more actively providing information, so as to inform subscribers of the status of NSnet activities.

### **3. Conclusion**

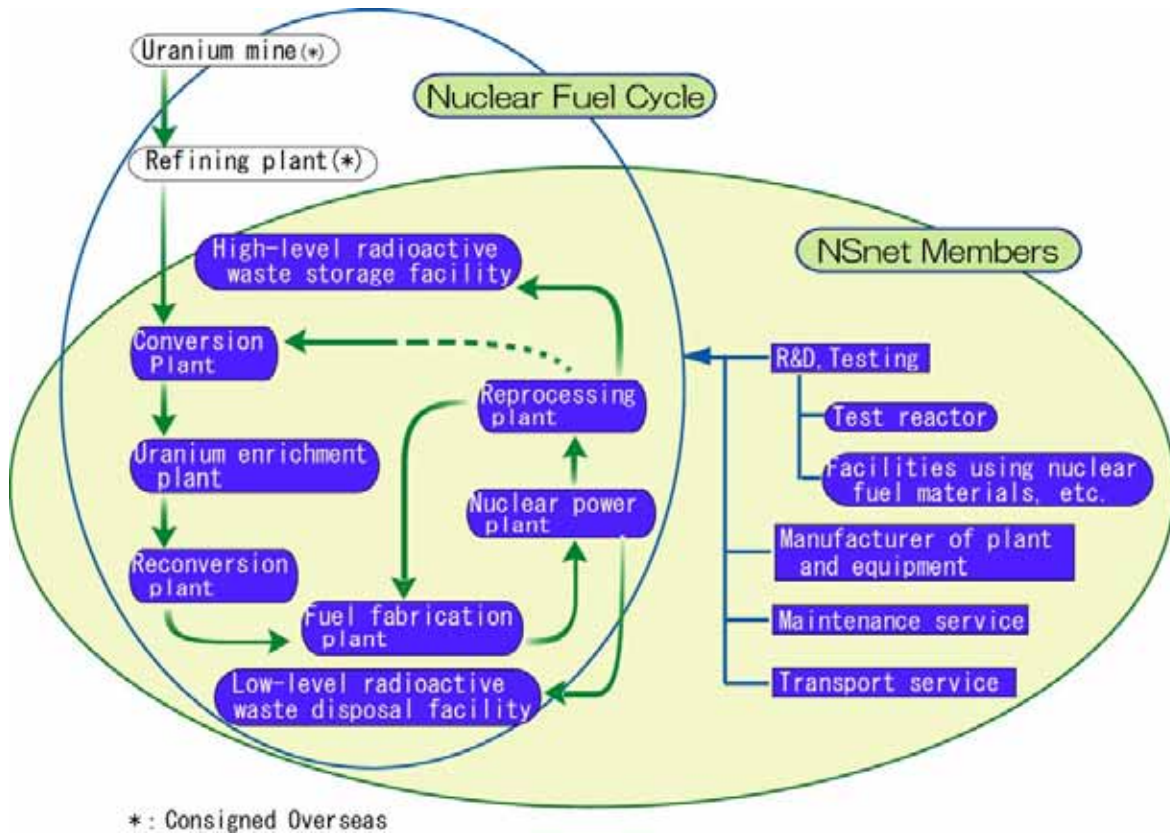
Four and a half years have passed since the establishment of NSnet. NSnet has been working to foster and improve the safety culture of members, including transport-related facilities, through the three main activities described above.

In addition, one facility has been selected per each member for undergoing the ongoing investigation on the safety climate of the workplace. From the perspective that considering individual safety and ensuring safe behavior are important in preventing human-caused trouble, questionnaire surveys are conducted on workplace morale-related factors, safety-related factors, and ethics; the features of the workplace's safety climate are quantitatively grasped, analyzed, and evaluated; and the improvement points of member safety management activities are defined.

NSnet is investigating and examining the data items and performance indicators (PI) for objectively evaluating and judging the members' safety management activities. In this connection, NSnet is introducing the utilization methods and merits of PI and precedent U.S. examples, while at the same time investigating examples of members' quantified data, examples from other industries, and examples obtained through daily safety activities. NSnet has thus selected 190 items as PI. The utilization of these PI, as indicators for self-evaluation of safety management activities, have been proposed to the members, after tailoring these PI to the form of the facilities and shifting through them. However, at this point in time, it would be hard to say that the PI are being utilized. NSnet will examine issues such as promoting the understanding that PI utilization is necessary, improving the usability of indicators, and developing facility-specific common PI.

Based on past activity results, NSnet intends to more firmly establish the safety culture in the workplace, accumulate safe and stable operation performance, and ease the siting area and general citizens' concerns over nuclear power, to contribute to restoring the trust in and promoting the sound development of the nuclear power industry.

Figure 1. Composition of NSnet members



**Table 1. NSnet Members**

Utility companies	Hokkaido Electric Power Company, Incorporated Tohoku Electric Power Company, Incorporated The Tokyo Electric Power Company, Incorporated Chubu Electric Power Company, Inc. Hokuriku Electric Power Co., Inc. The Kansai Electric Power Company, Inc. The Chugoku Electric Power Company, Inc. Shikoku Electric Power Company, Incorporated Kyushu Electric Power Company, Inc. The Japan Atomic Power Company, Inc. Electric Power Development Co., Ltd. Japan Nuclear Fuel Limited Nuclear Fuel Transport Co., Ltd. Laser Atomic Separation Engineering Research Association of Japan
Plant manufactures, Fuel fabricators-other members	Toshiba Corporation Hitachi, Ltd. Mitsubishi Heavy Industries, Ltd. Mitsubishi Electric Corporation Ishikawajima-Harima Heavy Industries Co., Ltd. Fuji Electric Systems Co., Ltd. Sumitomo Atomic Energy Industries, Ltd. Nippon Nuclear Fuel Development Co., Ltd. Nuclear Development Corporation Kobe Steel, Ltd. Hitachi Zosen Corporation Mitsui Engineering & Shipbuilding Co., Ltd. JGC CORPORATION Nuclear Fuel Industries, Ltd. Mitsubishi Nuclear Fuel Co., Ltd. Global Nuclear Fuel Japan Co., Ltd. Mitsubishi Materials Corporation Sumitomo Metal Mining Co., Ltd . JCO Co., Ltd.
Research institutes	Japan Nuclear Cycle Development Institute Central Research Institute of Electric Power Industry Japan Atomic Energy Research Institute