Introduction

In Japan, transport of fresh fuel to commercial nuclear power plants started on a regular basis approximately 30 years ago, while transport of spent fuel started approximately 20 years ago. Transport of low-level radioactive waste (LLW) on the other hand started in 1992.

Nuclear Fuel Transport Company (NFT) is assigned to transport spent fuel and LLW from nuclear power plants to domestic reprocessing plants and the LLW Disposal Center respectively. NFT is also engaged in unloading returnable vitrified high-level waste and UF6 at Mutsu-Ogawara (MO) Port, Rokkasho-mura, Aomori Prefecture and their overland transport to the nuclear fuel facilities of Japan Nuclear Fuel Limited (JNFL).

In order to secure safe transport of these materials, NFT strictly observes international regulations such as IAEA Regulations for the Safe Transport of Radioactive Materials and equivalent national regulations. In addition, NFT has prepared independent safety measures in cooperation with consignors, or utilities and consignees. Thanks to these activities, no accident has so far been recorded.

For transport of fresh fuel, utilities and fuel fabricators maintain close cooperation to ensure safety. For international transport of spent fuel under the overseas reprocessing agreement, COGEMA, BNFL, PNTL and Japanese utilities make maximum efforts to achieve transport safety through mutual cooperation.

For the first few transports of nuclear materials, a number of anti-nuclear activists took part in protests. But later on these activities gradually decreased to mere monitoring of the transport operation by a minority of anti-nuclear group members.

During the period of international transport of plutonium by “Akatsuki-maru” from 1992-93 and vitrified high-level waste in 1995, strong opposition was expressed by the relevant coastal states. Transport issues raised by a US scholar were reported by the mass media, and protest activities within these states were also very active. These movements were not aimed at the transport itself but rather at preventing selection of nuclear power utilization and the nuclear fuel cycle option. The main concerns about sea transport are pollution of the ocean by accidental sinking of or fire on the dedicated transport ship.

We are pleased to introduce our measures for securing transport safety and
meeting the concerns of the public.

**Securing Transport Safety and Countermeasures for Public Concern in Japan**

Assuring safety for transporting nuclear materials is achieved by securing cargoes in safe packages and carrying them by means of safe conveyance and in a safe manner under careful control. In addition to observing relevant regulations the operator arranges independent countermeasures.

**Containing Cargoes in Safe Packages**

This is implemented initially by selecting packages appropriate for containing specific materials. It is further accomplished by satisfying the IAEA transport regulations, relevant national regulations and technical criteria, which have been, formulated in line with the IAEA requirements. Type B packages are evaluated to meet technical criteria in terms of structural strength, fire resistance, containment, shielding and subcriticality for design approval. The packages as prepared for shipment are approved for transport by the competent authority through prior-to-shipment inspection. The packages are maintained to retain their design performance and decertified through annual, three-year and 10-year inspections. The packages for vitrified high-level waste are evaluated to withstand immersion up a depth of 3,000 meters.

**Use of Safe Transport Equipment and Safe Transport Methods**

Transport safety is assured by using dedicated ships, vehicles and cranes which satisfy the relevant regulations and are approved accordingly. Specifically, the dedicated ships are constructed in accordance with national regulations, which have incorporated the INF Code of the International Maritime Organization (IMO). This INF Code is applied to the carriage of irradiated nuclear fuel, plutonium and high-level radioactive waste. Safety of transport is further enhanced by the following measures:

1. Route for the dedicated ship is determined prior to voyage.
2. Watch at the bridge is conducted by 3-member shifts.
3. Entry into and departure from port of the ship is attended by a pilot and also accompanied by a tug boat.
4. The ship is provided with a tracking system and transponder to indicate her position. She is also provided with fittings to be lifted for salvage.
5. For overland transport of Type B packages, a co-driver system is adopted. An emergency breaking button can be operated by a stand-by driver in case of an emergency.
6. For overland transport of nuclear materials other than LLW, a convoy is formed and attended by personnel in charge, guards, a health physicist and transport workers.
7. After loading packages on vehicles, dose rates are measured on contact and at one meter from the surface to confirm that they satisfy the regulations.
Careful Control System

The following measures are taken prior to every shipment.

1. Prepare necessary manuals
2. Train and drill periodically
3. Practice emergency response activities periodically
4. Establish transport headquarters for every shipment
5. Check transport equipment prior to use
6. The following criteria are observed to assure safe operation:
   - Entry and departure of the ship and loading/unloading operation should be carried out during daylight
   - Entry of the ship should not be implemented under the following conditions
     - Wind velocity: 12m/s and over
     - Visibility: 1 mile and below
     - Wave height: 1.5m and over
   - Loading/unloading operation should not be implemented when ship motion is excessively great or under strong wind
   - Vehicle carrying Type B package should be operated at 25km/h or below.

As mentioned above, safe transport operation has been performed without one single accident, while implementing independent safety measures as well as complying with relevant regulations.

Most of the residents in the vicinity of nuclear power plants and in and near Rokkasho-mura have not displayed anxiety over nuclear power plants and nuclear transport. They have been well informed about power plants and transport, and have trust in them. Reactor operators and transporters routinely come in contact with local residents to explain their activities, thus fostering a feeling of trust on the side of residents.

The problem is how to obtain the understanding of the general public who are informed only through the mass media such as newspapers, magazines and television. The mass media do not usually report operators’ careful work or the brilliant operational record but tend to focus on anti-nuclear activities of a few people. When it comes to international transport, usually nothing is reported by the mass media.

Public Acceptance Activities and Release of Information by Operators

Prior to commencing nuclear materials transport, electric utilities, the reprocessor (JNFL) and the transporter (NFT) make presentations to local government, neighboring local governments, fishermen’s associations and local residents about safety measures. They allow them to observe the transport equipment in the process of fabrication and training of personnel at the port of receipt.

NFT has so far carried out public acceptance activities as shown below:
- Invitation of local media to handling rehearsal of vitrified high-level waste packages
We also invited the local mayor to the entry and departure of the Rokuei-Maru at MO Port and the handing operation of packages.

Regarding the release of information, we do our best in accordance with the
Several Noteworthy Events

New Mayor Elected

In November 1997, an election took place in Rokkasho-mura with three candidates: two were pro-nuclear, and one a stubborn anti-nuclear. The previous mayor used to say that the LLW and spent fuel transport ships were treasure boats which brought something precious to the village. But he lost the election. Fortunately the new mayor is also an advocate for nuclear development. Through this election we found that only 1% of the total vote was anti-nuclear, that is, there was only 1% of anti-nuclear people in the village. Therefore it is judged that almost all villagers are now pro nuclear.

In February 1998 when the new mayor visited our spent fuel transport ship “Rokuei-Maru”, he expressed regret about the delay in signing the safety agreement on reprocessing caused by reluctance on the part of the prefectural government. The local prefectural government hesitated to sign the agreement, so we had to wait for the prefectural governor’s positive action toward signing the agreement.

The long waited agreement was finally signed on the 29th of July, 1998 and the first shipment of spent fuel took place on the second of October from TEPCO Fukushima No. 2 Nuclear Power Station. Unloading and transport were performed quite safely and on schedule. More than 200 anti-nuclear members gathered around the port and also a little less than 200 pressmen from 19 press agencies reported every motion of transport activities. Therefore the explanation to, and interview with the press was very important to acquire local public acceptance on the nuclear matters

Port Call of an HLW Transport Ship Postponed

On March 10, 1998 when a PNTL ship carrying three HLW casks arrived at MO Port from Cherbourgh, France, she was not permitted to berth by the prefectural governor. He said that it was not a refusal but that he found the conditions for receiving the ship unsatisfactory.

The governor's policy was to meet directly with the prime minister, and talk about his prefecture's nuclear concepts. There was a nationwide critique that it was not normal for the governor to talk directly on these issues to the prime minister. The governor had two intentions: one was to confirm the final HLW disposal site as soon as possible and the site must be outside Aomori Prefecture. The other was to have a special rescue team for nuclear disasters.

With the ship floating near MO Port after a 45-day voyage from France, hard discussions took place between the prefectural governor and the cabinet chief secretary who finally reached a compromise: the prime minister would meet the governor on the condition that he would issue permission for the ship's berthing.

Now the nuclear issue in Aomori became a nationwide matter handled by both
ministers of STA and MITI. At present, it is not a matter of transport safety but political manipulation.

Celebration on LLW Transport Achievement

In December 1997, we achieved the transport of 100,000 LLW drums. To commemorate this event, we held a "thanksgiving" ceremony, inviting those who had contributed to this success. Thereafter we held a reception to celebrate the event, inviting not only those concerned with nuclear transport but also some representatives from BNFL and COGEMA. The party was so enjoyable with many KARAOKE songs and chat which helped to deepen mutual communication among those concerned with the transport activities. It made us feel that the foundation had somehow been consolidated for the transport of heterogeneous LLW, which was planned to be carried out shortly.

US manufactured Cask

In April 1998, I took part in a ceremony at the port of Baltimore where a shipment to Japan of nine PCC(Precision Component Corporation) made casks was celebrated. The ship carrying these casks sailed out to sea and arrived in Japan in June of that year.

The US manufactured casks will contribute to the transport of spent nuclear fuel in our country and it will demonstrate that Japan-US cooperation is very useful for the development of nuclear power in Japan.

In October 1998, an unexpected thing happened: disclosure of data falsification pertaining to the analysis of resin in the process of its installation in our casks.

We prepared 40 casks: 9 units by PCC and 31 by Japanese cask makers. The latter believed the resin data just like they do for mill-sheet.

Anyway, the data falsification was made public by the whistle blower who was engaged directly in the illegal affairs. So all the data were rechecked by the special investigation committee which was established by the competent authority and it took several months to restore the permit for usage of the casks. Very fortunately PCC’s casks had their resin installed perfectly well and PCC enjoyed their reputation as a cask fabricator and also contributed to our transport activities.

Interim Storage of Spent Fuel

Some nuclear power plants are beginning to suffer from shortage of spent fuel storage capacity. NFT have already leased SF casks to several plants. They are now transferring spent fuel from the full reactor pond to the adjacent pond with more room. We are fabricating several casks for other nuclear power plants. In the near future almost all plants may have contract with us.

Reflecting such situations a new legislation will be added to the Reactor Control Law for AFR interim storage of spent fuel. This plan is expected to be implemented around the year 2010. NFT will play some role in this new business field and has already decided to begin preparation to support this plan.
Future Management of HLW

When the first HLW transport ship arrived at MO Port from France on the 26th of April, 1995, local prefectural governor refused her berthing. His claim was to obtain a clear guarantee from the competent authority and power companies that the HLW shall be removed from his prefecture to other places after 30 to 50 years of storage. The minister for STA issued a letter of guarantee while all the utility presidents also wrote a letter promising that Aomori prefecture would not be made final disposal site.

Accordingly the solution of this grave task has been a matter of great concern since the first unloading operation of HLW.

Quite recently, draft legislation dealing with the future management of HLW was submitted to the Diet and currently under deliberation.

It is expected that the draft legislation will pass the Diet this year. Then the focus will move to where to find an appropriate site for the future final disposal.

As for NFT, we must deal with this matter by evolving new technology, a technology of transporting HLW from present interim storage facilities to a deep underground disposal site, which at present no body knows.

Conclusion

In order to achieve the target for the reduction of greenhouse gas emissions as agreed at COP3 in Kyoto, it is inevitable that nuclear power will form a certain part of the total power supply. It is correspondingly vital for the nuclear fuel cycle operation to be supported by a secure transport system. As a transporter we have made every effort to ensure safety and have achieved an accident free record over the past 20 years.

For the success of our operation, we have strictly observed national and international regulations while establishing secure measures for transport. We have developed public acceptance activities to make local residents understand and accept our activities.

With increasing international shipments of vitrified high-level waste and MOX fuel and with the commencement of regular domestic transport of spent fuel, it is very important to further develop public acceptance campaigns on a global scale.