

## PUBLIC ACCEPTANCE ACTIVITIES ON SEA TRANSPORT IN JAPAN

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### SUMMARY

Public acceptance activities on sea transport of nuclear fuel and radioactive waste have been carried out in Japan by Nuclear Fuel Transport Company(NFT) who is exclusively dedicated to such shipment.

At present, domestic transport of spent fuel is carried out by sea from nuclear power plants to the Tokai Reprocessing Plant of Power Reactor and Nuclear Fuel Development Corporation(PNC), and transport of HLW, LLW and natural  $UF_6$  is performed to the Fuel Cycle Facilities of Japan Nuclear Fuel Limited(JNFL) in Rokkasho-mura, Aomori Prefecture. In the near future, spent fuel of the domestic nuclear power plants will be transported to the JNFL's Rokkasho Reprocessing Plant which is under construction.

In order to perform the transport without delay and in orderly manner, it is vital to have local residents' understanding and accept nuclear transport activities. It is also important to contribute to the development and prosperity of relevant regions through, for example, mobilization of local industries and employment of inhabitants.

This paper presents in detail how the above-mentioned public acceptance activities have been carried out, including invitation of the local residents to an onboard tour of the dedicated ship "Sei-ei Maru" for LLW transport.

### INTRODUCTION

In Japan, a total of 52 nuclear power plants are now in operation with a power generating capacity of approximately 45GW. This accounts for more than 30 per cent of the country's total power generation.

It is the basic policy of Japan to recycle spent fuel, therefore, spent fuel is transported to a reprocessing plant. Recovered uranium and plutonium are reused as fresh fuel and high level radioactive wastes are stored tentatively for eventual disposal. Low level radioactive wastes generated in the course of nuclear power plant operation and maintenance are transported to LLW Disposal Center and natural uranium hexafluoride( $UF_6$ ) is delivered to the enrichment plant.

The transport of nuclear fuel materials and radioactive wastes associated with nuclear power operation is carried out by the Nuclear Fuel Transport Company(NFT) for the followings:

- (1)Transport of spent fuel from nuclear power plants to Tokai Reprocessing Plant
- (2)Transport of low level radioactive waste(LLW) from nuclear power plants to the JNFL's LLW Disposal Center
- (3)Unloading of vitrified high level radioactive waste(HLW), (returned from European reprocessing plants) from a transport ship and subsequent transport overland from the ship to the HLW Management Facility of JNFL
- (4)Unloading of natural uranium hexafluoride(UF<sub>6</sub>) (dispatched from overseas plants) from a transport ship and subsequent transport overland from the ship to the JNFL Enrichment Plant
- (5)Transport of spent fuel from domestic nuclear power plants to JNFL's Reprocessing Plant

Primary mode of these transports is sea mode which is supported by terminal short distance overland transfer, and public acceptance is required for both sea and land transports.

#### SPECIAL FEATURES OF TRANSPORT IN JAPAN

In Japan, all nuclear power plants are erected on the sea coast as shown in Figure 1. The Tokai Reprocessing Plant and JNFL's Nuclear Fuel Cycle Facilities are also located near the coast.

Most of the nuclear power plants are provided with their own berth in the reactor site, where spent fuel or LLW is loaded on board a dedicated transport ship and transported to a near-by port of a reprocessing plant or LLW Disposal Center: Tokai Port of the Tokai Nuclear Power Plant(Japan Atomic Power Co. ,Ltd.) is used for terminal transport of spent fuel to the Tokai Reprocessing Plant, and Mutsu-Ogawara Port in Rokkasho-mura, Aomori Prefecture is used for transport to JNFL's Nuclear Fuel Cycle Facilities.

Natural UF<sub>6</sub> imported from overseas and HLW returned from European reprocessing plants are also brought to the Mutsu-Ogawara Port for unloading at Takahoko Wharf.

Thus, the transport is performed primarily by ship. The associated terminal land transport from the port to receiving facilities takes place for a short distance of only several kilometers, of which public road and crossing cover only a few hundreds meters. A typical system for transporting spent fuel and LLW is shown in Figure 2.

For ship transport there is essentially no limit in size and weight of cargoes. They are limited by lifting capacity of the handling crane and space for handling the package. Generally speaking, payload of packagings greatly increases as the weight of the packagings increases. Therefore, in order to reduce transport frequency and associated radiation exposure of transport workers, the packages for sea transport are designed to the weight limit imposed by crane and handling space.

To be concrete, there are six types of spent fuel packages corresponding to six groups of crane

capacities at the nuclear power plants: four types of BWR casks and two types of PWR casks.

As with land transport, the safety of nuclear materials transport is assured by means of packages. To further enhance the safety of ship in the event of maritime accident, the ship is designed and constructed in accordance with the INF Code of the International Maritime Organization (IMO). Main features are that the ship is constructed in double hull and double bottom against collision and stranding, and is provided with a latest GPS and radars for safe navigation and also redundant equipment for important safety systems such as cask cooling system.

At the Takahoko Wharf of Mutsu-Ogawara Port there are two sets of loading/unloading crane: a 150-ton crane for spent fuel and HLW packages and a 25-ton crane for LLW containers and UF<sub>6</sub> packages.

For overland transporters there are four 135-ton carriers for spent fuel and HLW packages and twelve 20-ton trucks which are all exclusively used for the dedicated purpose. Natural UF<sub>6</sub> is transported by common track-trailers.

#### PUBLIC ACCEPTANCE ACTIVITIES

Nuclear fuel transport is carried out in public domain (public roads, the open sea and ports). This situation is very different from stationary power plants, because transport operation takes place in the vicinity of the general public.

Transport regulations are formulated to ensure the safety of the public and environment. To the extent, therefore, these regulations are fully observed, assurance of safety for transporting nuclear materials should be achieved.

The transport safety will be further enhanced if the understanding and cooperation of the general public is secured. For this purpose, it is vital we take measures to obtain trust and support from the public.

Appropriate measures to achieve such goals are as follows:

- (1) Disclosure of information to the general public.
- (2) Exchange of information by dialogue.

As regards (1) this has been performed by the competent authority, Science and Technology Agency. Safety Analysis Reports of packages are opened to the public at Public Information Centers. Protection of commercial secrecy is taken into consideration in releasing the information.

Regarding the disclosure of information on specific transports, guidelines have been prepared for the transport of natural UF<sub>6</sub>, HLW, LLW and spent fuel as shown in the TABLE. In this connection physical protection and safeguards of the packages are taken into account.

As regards (2) this has been performed between NFT, local government and residents where the transport takes place from the port to the JNFL facilities.

Here are some examples of our activities:

(1) Invitation to the handling and transport demonstrations

Whenever transport of "first-of-its-kind" package is planned, training is carried out at the receiving wharf of Mutsu-Ogawara Port using the ship, package, crane and vehicle. Taking advantage of such an occasion, we invite the relevant local authority and mass media to observe such training to help them deepen their understanding and to request their cooperation.

(2) Invitation to shipbuilders and cask manufacturers

As the nuclear transport is the first experience to the residents in the vicinity of Mutsu-Ogawara Port, we usually invite them to observe the ships, casks, cranes and vehicles at various stages of their construction. For example, when a launching ceremony of a dedicated ship takes place, we invite local mayor and those concerned with the transport to the shipyard to observe the ceremony as shown in Figure 3. We sometimes invite representatives of local fishermen's association to observe the dedicated ships while they are under construction.

We are pleased to note that once it was recognized that the spent fuel transport casks had heavy walls as thick as 300mm, they were really accepted as safe, secure and reliable packagings.

Fortunately, it is now a policy of the local mayor and the village that they should positively observe transport equipment and operation with their own eyes to assure themselves that the transport will be done safely. Therefore the invitations to various events we offer to them proved really meaningful.

(3) Invitation to an "Open Day" for the dedicated ship "Sei-ei Maru"

An "Open Day" for the dedicated ship "Sei-ei Maru" started last year at Mutsu-Ogawara Port, attended by approximately 400 local residents. They enjoyed the day on board the ship, especially children were happy turning the real steering wheel, moving joy stick and looking into the radars as shown in Figure 5. They seemed to have been a sort of familiarized with the ship.

Incidentally there was an officer from the very village, Rokkasho-mura who enjoyed talking with his countrymen in good old dialect. The village people also shared the rejoice with him, felt familiar with the ship and it seemed they had soon understood that the ship was safe, secure and reliable. The participation of the local people to the "Open Day" thus resulted in a favorable effect of giving them an impression that the ship is not only safe but also secure and reliable.

Anti-nuclear groups also appeared at the event and communicated with us. We will continue to hold such events at other locations.

(4) Discussion with young local opinion leaders

It is getting recognized that the construction and operation of the Nuclear Fuel Cycle Facilities surely bring prosperity to the local areas as they progress at Rokkasho-mura.

To further activate the region, young local opinion leaders, such as Rotarians and company executives of thirties and forties, intended to deepen their understanding on nuclear facilities and transport. Responding instantly to such movement we had discussions with them several times, explained about nuclear power plant, dedicated nuclear transport ship and nuclear fuel packages, and answered to the questions they had ever conceived. It was then followed by their tour to a nuclear power plant, a dedicated ship and spent fuel casks. At the end of the tour they expressed that most of their concerns had been cleared and wished that such opportunities be also given to other local residents. Furthermore, they are surveying the activities of corresponding local opinion leaders around existing nuclear sites to study how to build up their own village. It is quite encouraging to hear that local mayor and village office welcome such activities of young generation.

#### (5) Education of local transport workers

A full-day educational course is provided every year to managers and personels of local companies directly involved in transport of nuclear fuel materials, such as trucking and safeguard company people. The course is provided separately from practical and specific training and covers wide spectrum of nuclear transport and related subjects: transport regulations, construction and safety of nuclear material packages(SF, LLW, HLW, UF<sub>6</sub>) dedicated ships, physical protections, human errors and recent accidents in nuclear facilities transport. We believe that the best way of public acceptance is transport workers work in secure and reliable state and their family enjoy their life similarly.

## CONCLUSION

Different from nuclear power plant operation, transport of nuclear materials takes place in the vicinity of the general public.

In Japan, spent fuel and radioactive waste are primarily transported by sea and short terminal transport is carried out by land.

Under such circumstances smooth and timely transport cannot be achieved without understanding and cooperation from the general public and fishermen.

Nuclear Fuel Transport Company, which is exclusively engaged in transport of LLW and spent fuel and overland terminal transport of HLW and UF<sub>6</sub>, have performed various activities of public acceptance for such transport, such as invitation of the local representatives to a launching ceremony of dedicated ships, invitation to observing casks under construction, holding of an "Open Day" of a purpose built ship and discussion with young local opinion leaders. As the results a wide gap of recognition on safety of nuclear transport between the enterprise and local residents has been mostly filled out and the transport is currently carried out in timely and orderly manner.

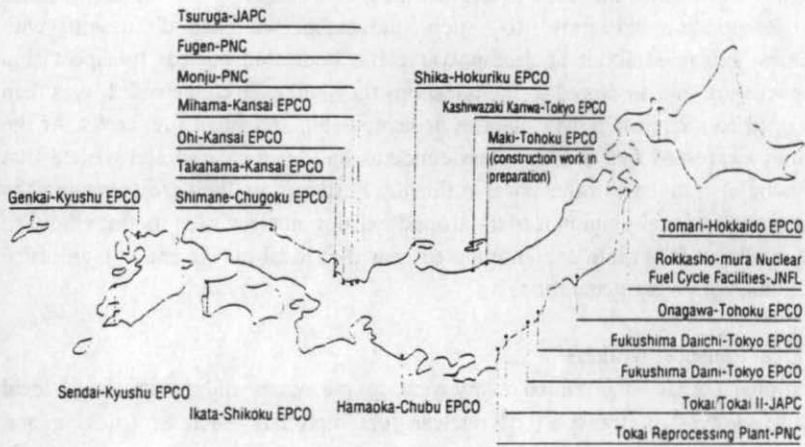


Figure 1 Location of NPP's and nuclear fuel cycle facilities in Japan

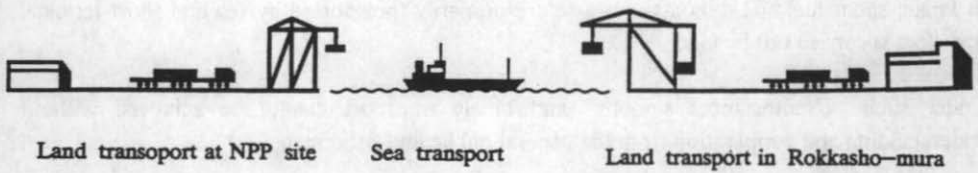


Figure 2 Typical nuclear transport system in Japan



Figure 3 Local representatives attend a launching ceremony of a dedicated ship



Figure 4 Local mayor observes fabrication of spent fuel casks



Figure 5 An "Open Day" of a dedicated ship, at the bridge deck

TABLE Guidelines for disclosure of transport information

Transport of HLW	<ul style="list-style-type: none"> <li>• Planned date of ship's departure Name of ship and port (disclosed 1-2 days before departure)</li> <li>• Route of voyage Planned date of arrival in Japan (disclosed 1 day after departure)</li> <li>• Planned date of arrival at Mutsu-Ogawara Port (disclosed 1 week before arrival)</li> </ul>
Transport of UF <sub>6</sub>	<ul style="list-style-type: none"> <li>• Planned date of departure and arrival Places of departure and arrival Name of consignor(utility company) Quantity of material transported Method of transport Route (disclosed the day before)</li> </ul>
Transport of LLW	<ul style="list-style-type: none"> <li>• Nuclear power plant side Planned date of departure Route Quantity of LLW transported Outline of transport operation (disclosed the day before)</li> <li>• JNFL side Name of dispatching nuclear power plant Time of period for transport Quantity of LLW transported (disclosed 2 weeks before)</li> </ul>
Transport of SF	<ul style="list-style-type: none"> <li>• Name of dispatching and receiving plant</li> <li>• Quantity of material transported</li> <li>• Type of packaging</li> <li>• Transporting entities</li> <li>• Date of transport ,name of conveyance (disclosed after transport )</li> </ul>