Emergency Response Arrangements for the Transport of Irradiated Nuclear Fuel from Japan to Europe in Japanese Territorial Waters

T. Ikeda, T. Inada and S. Narahara

Nuclear Services Company , 1-6-1, Ohtemachi, Chiyoda-ku, Tokyo 100 JAPAN

R.D. Cheshire and G. Lee

British Nuclear Fuels plc , Risley, Warrington, Cheshire WA3 6AS UK

INTRODUCTION

About 90% of nuclear fuel irradiated in Japanese nuclear power stations is transported to UK and France for reprocessing. Pacific Nuclear Transport Ltd (PNTL), a subsidiary of British Nuclear Fuels plc (BNFL), owns and operates its own fleet of 5 purpose built ships specially designed for the transport of flasks containing irradiated fuel from Japan to Europe. These vessels sail to Japan on 8 to 10 voyages per year from the BNFL's Marine Terminal at Barrow in UK via Cherbourg Port in France. On arrival in Japan empty flasks are delivered to Japanese nuclear power stations, and full flasks are collected for the return journey to Europe.

Whilst the probability of a serious flask incident involving the release of radioactivity is very small, it is nevertheless important to plan for such an emergency.

In the case of an incident BNFL will provide an emergency response. If an incident occurs in Japanese territorial waters, the initial response will be provided by Nuclear Services Company (NSC), who are based in Japan (the head office in Tokyo, Tokai Office in Ibaraki Prefecture and Tsuruga Office in Fukui Prefecture) and contracted to BNFL to provide a similar response to that available from UK.

This paper will describe the communication links which have been established between UK and Japan and the internal communication within Japan. It will also describe the emergency equipment held in Japan, the training of teams and the results of exercises jointly carried out with BNFL.

EMERGENCY RESPONSE ARRANGEMENT

The aim of the BNFL/PNTL emergency response arrangements including the activities by NSC is to achieve a rapid and effective response to an incident involving;

a) A loaded nuclear transport flask on board a BNFL/PNTL vessel

or

b) A marine problem to the vessel itself.

Depending on the extent of the mishap, this could be followed up by emergency teams, trained and equipped to minimise any radiological consequences of the incident. Arrangements have been made to move an expert team rapidly to any point on the ships route.

The communication between BNFL and NSC emergency teams despatched to the vessel is made through the Tokyo Communication Centre at the NSC head office. In the Tokyo Communication Centre where the Emergency Headquarters will be formed in the case of an emergency, various communication equipment such as telephones, a facsimile, a telex, and a board that represents the schedules and locations of the PNTL vessels in Japanese territorial waters, flasks loading information etc. are installed.

All equipment that NSC emergency teams will carry to the involved vessel is kept and maintained at Equipment Centres in Tokai and Tsuruga area.

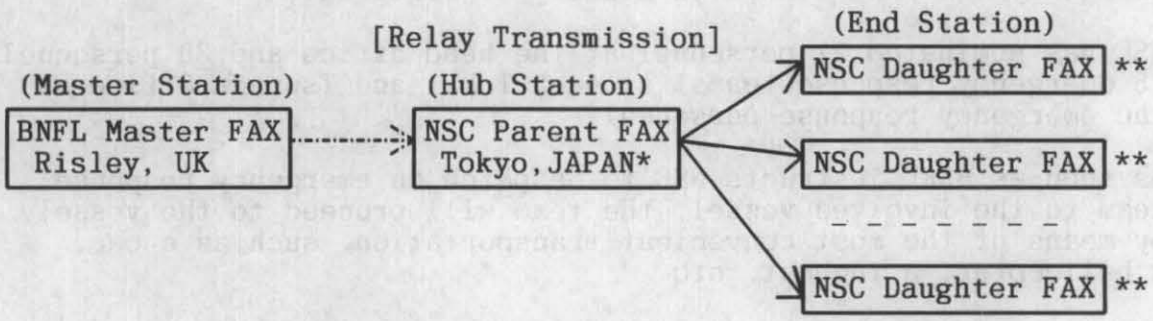
Since good communication between BNFL and NSC is essential to achieve this task, NSC has built up an Emergency Fax Communication System (EFCS) in order for BNFL to make a rapid and reliable notification of the incident. The EFCS consists of 17 highly developed facsimile machine, which are one at the BNFL head office called a "BNFL Master FAX", one at the Tokyo Communication Centre called a "NSC Parent FAX" and 15 called "NSC Daughter FAX's" installed at the home of 5 personnel in Head Office, at both Equipment Centres and at the home of 4 personnel each in Tokai and Tsuruga Offices.

In the event of an incident, BNFL will transmit the notification to the NSC Parent FAX from the BNFL Master FAX and have the NSC Parent FAX execute the multi-address transmission to 15 NSC Daughter FAX's automatically using the function called "Relay Transmission". (See Figure 1)

This is especially important for notification to emergency team members during silent hours.

FIGURE 1

EMERGENCY FAX COMMUNICATION SYSTEM



*:NSC Parent FAX is installed at the Tokyo Communication Centre.

**:15 NSC Daughter FAX's are installed as follows;

Head Office; 5

Tokai Office; 5 including the Equipment Centre

Tsuruga Office; 5 including the Equipment Centre

ACTION BY NSC EMERGENCY RESPONSE TEAM

For the first notification of an incident to NSC, that includes the situation and the ship's location, the EFCS shall be used whether or not it occurs during normal working hours of NSC. After the first notification, ordinary communication system between BNFL, Risley and NSC, Tokyo by telephone, telex and/or facsimile will be used in place of the EFCS.

The personnel in the head office who receive the notification proceed to the Tokyo Communication Centre, contact to the nominated emergency response personnel and form the Emergency Headquarters, while the personnel either in Tokai or Tsuruga Office depending on the place of the incident proceed to the Equipment Centre, contact the nominated personnel and place an emergency team and others on standby if required.

NSC has nominated 21 personnel at the head office and 30 personnel (5 emergency response teams) at each Tokai and Tsuruga Office as the emergency response personnel.

As soon as BNFL instructs NSC to despatch an emergency response team to the involved vessel, the team will proceed to the vessel by means of the most convenient transportation, such as a car, a helicopter, a tugboat, etc.

After the arrival at the vessel, the NSC emergency team will execute radiation survey and engineering checkup on the flasks onboard under the instruction of the Ship's Master. These results will be reported to the BNFL Emergency Control Centre through the Emergency Headquarters at Tokyo Communication Centre, and remedial engineering work will be advised if required.

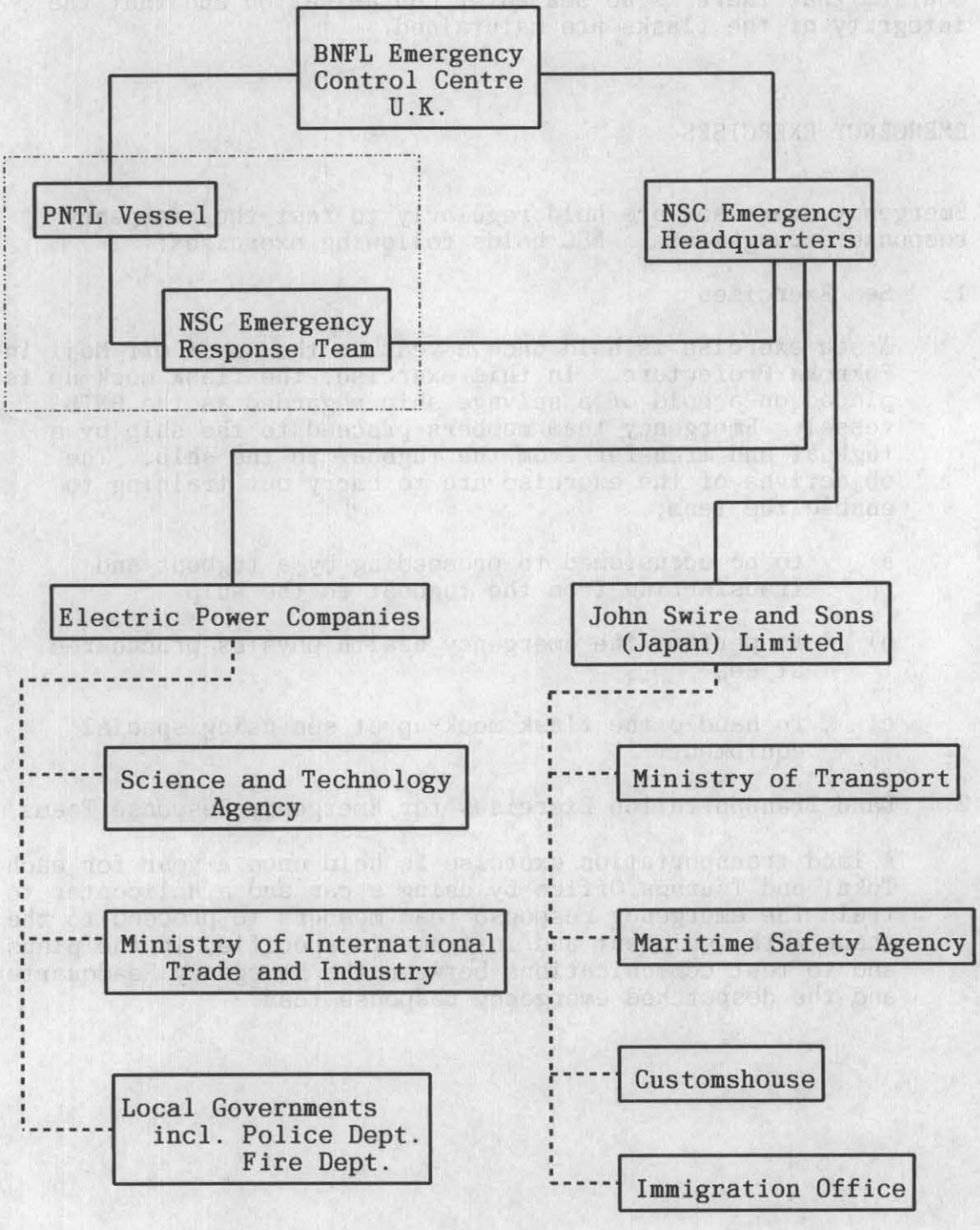
At the same time, the Emergency Headquarters will notify the condition of the flasks to the relevant Japanese electric power companies and John Swire and Sons (Japan) Limited, the representatives of PNTL in Japanese territorial waters, supposed to report the incident to the Japanese Ministry of Transport, the Maritime Safety Agency, the local governments, etc.(See Figure 2)

EMERGENCY RESPONSE EQUIPMENT

A range of equipment is available in both Tokai and Tsuruga Equipment Centres to be taken with the team depending on the nature of the incident. This includes health physics and engineering equipment similar to that in UK. In addition, specialised equipment is available to be taken with the team, that includes a portable "Sea Water Radiation Monitor" to survey water around the involved vessel.

FIGURE 2

EMERGENCY COMMUNICATION ARRANGEMENTS INSIDE JAPAN



In the event of an incident, including vessel misfortune, the radioactivity of sea water around the ship can be measured continuously by the Sea Water Radiation Monitor carried by the NSC emergency team. This monitor can also distinguish between nuclides and measure its amount of radioactivity. The monitor consists of a personal computer, a multi-channel analyser, a detector, a pump and hoses.(See Figure 3)

With respect to "Public Acceptance", it is very important to confirm that there is no sea water contamination and that the integrity of the flasks are maintained.

EMERGENCY EXERCISES

Emergency exercises are held regularly to test the emergency response arrangements. NSC holds following exercises;

1. Sea Exercises

   A sea exercise is held once a year on the coast off Moji in Fukuoka Prefecture. In this exercise, the flask mock-up is placed on a hold of a salvage ship regarded as the PNTL vessel. Emergency team members proceed to the ship by a tugboat and transfer from the tugboat to the ship. The objectives of the exercise are to carry out training to enable the team;

   a) to be accustomed to proceeding by a tugboat and transferring from the tugboat to the ship

   b) to perform the emergency health physics procedures at sea

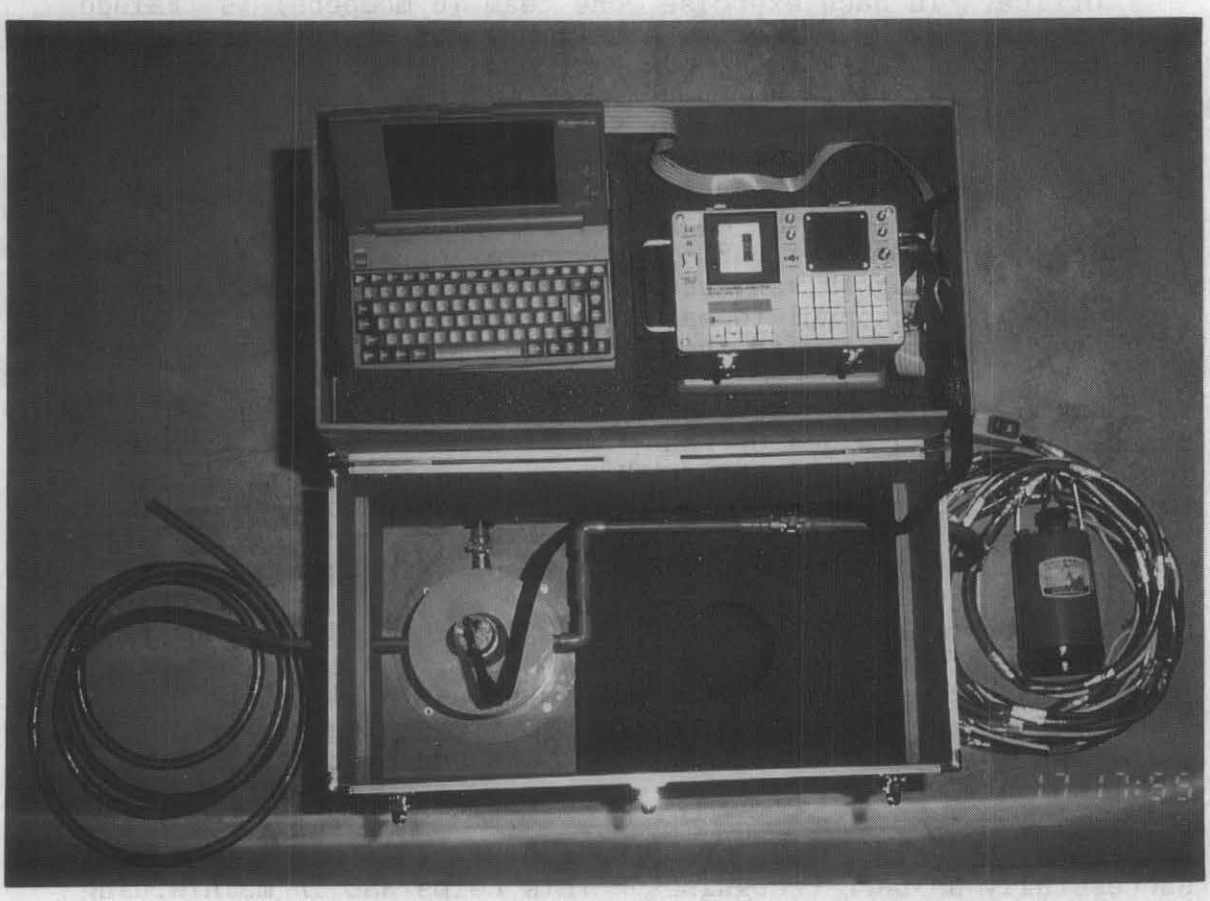
   c) to handle the flask mock-up at sea using special equipment.

2. Land Transportation Exercises for Emergency Response Teams

   A land transportation exercise is held once a year for each Tokai and Tsuruga Office by using a car and a helicopter to train the emergency response team members to proceed to the scene with equipment and instruments specified in the plans and to test communications between the Emergency Headquarters and the despatched emergency response team.

FIGURE 3

SEA WATER RADIATION MONITOR



3. Communication Exercises

A communication exercise is held once a year especially to train the emergency personnel at the NSC head office to reconfirm their own roles and to communicate with the organisations needed to be notified in the event of an incident.

4. Monthly Flask Handling Exercises using Equipment and Instruments Specified in the Plans

This exercise is held once a month in each Tokai and Tsuruga Office. In each exercise, one team (6 members) is trained to perform the emergency health physics procedures and to handle the flask mock-up using special equipment in the plans.

5. Flask Handling Training at Sellafield

NSC annually sends several emergency response personnel to train to perform the emergency flask handling at the Sellafield Site of BNFL in co-operation with BNFL personnel. This training is very useful for both BNFL and NSC emergency response personnel to make good communication and to have the consensus toward the safety culture.

In addition, NSC sends several emergency response personnel annually to watch a Sea or Land Exercise held by BNFL in order for them to have an idea of BNFL/PNTL emergency response arrangements. BNFL also sends their personnel to witness a number of exercises held by NSC to confirm that the NSC exercises are satisfactory in respect of BNFL/PNTL emergency response arrangements.

Although the probability of a serious flask incident involving the release of radioactivity is very small, the scenarios often postulate that a release has occurred so as to allow the participants to test their response to a radiological incident using the communication arrangements and equipment specified in the plans.

All exercises held by NSC are prepared well and completed successfully as BNFL recognises. This helps NSC in maintaining high quality of emergency response ability and contributes greatly to BNFL/PNTL emergency response arrangements.

REFERENCES

Cheshire R D, Emergency Response Arrangements for the Transport of Irradiated Nuclear Fuel from Japan to Europe. PATRAM'89 The 9th International Symposium on Packaging and Transportation of Radioactive Materials, June 11-16 1989, Washington DC, USA, Volume I p.1405-1412.