

TRANSPORT OF SPENT FUEL IN THE UNITED STATES: WHAT CAN BE DERIVED FROM EUROPEAN EXPERIENCE

Danièle Raisonnier

Transnucléaire, 9-11, Rue Christophe Colomb, 75008 Paris, France

ABSTRACT

We are pleased to be here to present this paper on this complex, but stimulating issue. It is our first presentation on this matter in the US, not because we are just discovering America (our address in Paris being at Christopher Columbus Street...), but because we do believe that time has come to demonstrate that industrial spent fuel transportation can become a reality also in the United States.

The United States have a long history of transporting spent nuclear fuel. For over 30 years about 2500 shipments were performed but only few of them were coming from industrial facilities. There are therefore some bases: a technology has been developed and the regulatory framework as well as the industry capability are also in place. The substantial increase over the number of current shipments will require to review existing procedures and to develop a comprehensive system to accommodate new shipping needs relative to human resources, packaging development and procurement, systems interfacing, logistics, regulatory requirement, training and operation.

The aim of this paper is to see if lessons learnt from the operating experience accumulated in Europe in this field can be of some use in the United States.

TN GROUP AND THE US TRANSPORTS

Transnucléaire-Paris (TNP) was created in 1963 by private investors, at the instigation of the French Atomic Energy Commission (Commissariat à l'Energie Atomique) to handle domestic and international transports of radioactive materials. In 1965, looking at the development of the nuclear energy in the US, the management of TNP decided to open a subsidiary in the United States (Transnuclear Inc TNY). The main purpose was to cover international transport activity with the aim to develop spent fuel transportation in the United States when the time comes.

In 1997, the acquisition of PACTEC and the creation of Transnuclear West to develop the Nuhoms dry storage and transportation system are the signal of the continuous involvement of our company in the development of this activity.

Looking at the work performed by the TN Group in the US in more than 30 years, one can say that TN experience is diversified and innovative. For example:

- in the frame of the so-called Off-Set Fuels Policy, renewed in 1996 under the Nuclear Nonproliferation Policy we performed more than 250 international transports of

foreign research reactor spent fuel to Savannah River Site and the Idaho National Engineering Laboratory (INEL), including procurement of casks, and recently of INF2 ships.

- transport services for several utilities (Commonwealth Edison, GPU Nuclear Corporation, Virginia Power, Duke Power..) were performed by TNY using four large transport cask systems of the TN8 and TNP designs.
- the TN group also completed detailed studies for the transport of the Shoreham fuel to COGEMA La Hague for recovery. For several reasons (mainly political) the fuel was transported to another US Nuclear Power Plant, by using however the transportation system we developed.

WHAT HAPPENED OVERSEAS ?

During the same period the situation in Europe was quite different, whereas some reprocessing facilities shut down, others extended both their storage and reprocessing capacities leading to regular and significant spent fuel transport activity.

From 1966 to 1974 the European reprocessing plant Eurochemic located in Belgium received fuel from different origins : Light Water Reactor (LWR) fuels coming from Italy, Germany, Netherlands NPP (Nuclear Power Plant) as well as research reactor fuel. Another plant EUREX was operating in Italy.

In the sixties (1966) the French CGR (Cooled Graphite Reactor) fuel in natural uranium was sent for reprocessing to La Hague and after 1976 to Marcoule. This plant, dedicated at the beginning in 1958 to defense programs has been shut down at the end of 1997 with a last campaign of CGR fuel for EDF and research reactor fuel for the French Atomic Energy Commission.

The major part of spent fuel has been transported to Sellafield UK (BNFL) and to La Hague France (COGEMA) dedicated progressively to LWR fuel.

So during 35 years Transnucléaire developed adapted transport casks and equipment to fit different transport means and operated in cooperation with reliable partners several thousands of transports by road, rail in all European nuclear countries or by sea from Japan, Sweden and Italy.

From 1973 to 1997, more than 20 600 Heavy Metal Tons (HMT) of LWR spent fuel have been transported to La Hague mostly from France (11 659 HMT), Germany (4 493 HMT), Japan (2 918 HMT), Belgium (650 HMT), Switzerland (582 HMT), and Netherlands (257 HMT), but also from Sweden (57 HMT) and even Italy (2 HMT).

Between 1973 and 1997, more than 5150 shipments of spent fuel have therefore been performed, most of them carried out by rail (more than 3350) and road (1 146).

About 30 000 tons of spent fuel will have been transported to La Hague and Marcoule in a 30 year period (1970-2000) corresponding to around 5500 shipments with an average of about 300 shipments a year or 1500 tons of Uranium, at the peak in 1985/1995.

OVERVIEW OF THE SITUATION IN THE US

The spent fuel is accumulating in the US Nuclear Power plants at a rate of about 2,000 Metric Tons of Uranium (MTU) per year and it is planned that the interim storage facility will be able to receive about 85, 000 MTU of spent fuel.

Recent legislative proposals have had the annual rate of acceptance by DOE commencing at 1,200 MTU and rising to an ultimate level of 3,000 MTU. It seems therefore reasonable to envisage the transport of quantities between 1,000 and 2,000 tons of heavy metal per year for quite some time, the annual rate increasing progressively to reach final y 3,000 MTY per year.

What is really different between these two situations between Europe and the US ? Due to the impressive figures in both cases and even if the political and energetic context, but also the time are different, one can easily guess that similar operational constraints and challenges might appear.

WHAT KIND OF CHALLENGE IS IT ?

First efforts have already been made by DOE and continue to be made: some scenarios have been produced, which forecast, when, from where and to where the spent fuel will need to be transported. The two other fundamental questions are: how much spent fuel will be shipped and how will it be shipped. This challenge could be summarized around three main items:

- logistics: the combination of transport modes would have to be organized , for example truck from reactor to nearest railhead, barges or a combination of barges and heavy haul trucks to transport spent fuel from a reactor site to railhead. Moreover the system would have also to take into account the different scenarios such as transports from reactor sites to storage facilities, from reactor site to a repository or from storage facilities to a repository. Effective and operational procedures, in fields as different as safety checks before transport, compliance with security measures, highway, rail and barges routing or public acceptance of transport.
- investments in transport equipment: large investment will be necessary to cover specific needs: wagons and trucks, but also different types of casks (for rail, barge shipment and for legal weight or overweight trucks). Handling and maintenance equipment need also to be considered. At last, general infrastructure and reactor sites or receiving points will need some improvements.
- set up of a general organization able to coordinate the work so that transports are made safely, economically and effectively taking into account a more complicated context: public acceptance, focus of media and opponents attacks.

WHAT LESSONS LEARNED IN EUROPE COULD BE USEFUL IN THE US ?

As far as transports to La Hague were concerned two dimensions had to be taken into account by the transport industry:

- the obligation to comply with specific constraints arising from the international nature of many transport (regulations, transport mode, local constraints)

- the necessity to meet a very large variety of requirements from strong and powerful operators: utilities and reprocessors.

Well-established methods have been implemented as standards

Methods established as standards have been developed and implemented in each country thanks to the cooperation of the reprocessor and a team of specialized companies led by TN. They have allowed to use different transport modes as well as multimodal transports considering the situation of each NPP (Nuclear Power Plant):

- road transports only from Belgian, Dutch and one Swiss NPP
- rail and road transports from German, Dutch and one Swiss NPP
- sea, rail and road transports from Japan and Swedish NPP.

Transports with regular rail service or special dedicated trains, as well as grouping wagons coming from different places have been performed.

Involvement of qualified and responsible partners

All the transports carried out have been done with a lot of different contributors.

- At the first stage, in addition to a good knowledge of the regulatory requirements, the definition of the package concept implies close partnership with shipping/receiving facilities, as well as with transport companies. Once the package concept has been tested and licensed, the manufacture of the packagings is subcontracted to firms specially qualified for this purpose and the TN Group ensures, under quality assurance, the manufacturing follow-up. TN achieves also the commissioning of the equipment and the training of the personnel.
- For transportation, partnerships have been set-up in the different modes of transport: transporters, forwarding agents, maritime and railway companies. Qualification relies on QA programs, certification and regular audits.
- To take only two examples: for trucking activities within Europe, TN relies on two subsidiaries based nearby to the reprocessor plant and the main NPP, operating with local personnel. About 60 trucks and drivers are regularly working for us. For transport by rail, a network of partners has been built in the countries involved, and in particular with SNCF (Société Nationale des Chemins de Fer Français) in France.
- At last, the TN Group has extended cooperation towards related services such as the maintenance of packagings. It operates also handling equipment, such as rail and port facilities and terminals in the vicinity of nuclear facilities.
- Beyond the logistical organization of these transports real time satellite tracking is providing detailed and comprehensive data on all parameters ensuring the correct accomplishment of the transport operation..

Relations in confidence with regulatory authorities

The constant contact with the Competent Authorities in charge of the regulatory framework has allowed to reach a high level of transport safety.

The participation of TN representatives as recognized experts in several working groups worldwide contributes to the up-grading or to the adaptation of the regulations and to provide the regulators with the operator advice.

It is also to the industry to analyze in detail events affecting the transport and to decide to keep informed the authorities even it is not a regulatory requirement.

In case of a crisis following an incident or accident and in order to be able to answer immediately to the assistance requested by the authorities, Transnucléaire has set up an Emergency Response Plan. It will therefore allow to provide human and material resources necessary to participate, if asked, in resolving the crisis situation. This plan covering all phases of alert, analysis and action gives Transnucléaire optimum response capability to face this type of event, applies to all types of radioactive materials and concerns all transport modes (road, rail, sea and air).

Following the recent case of contamination of spent fuel transport casks in Europe, the Authorities produced a report, listed a comprehensive set of measures. The operators involved made their best efforts to establish proposals for improvement and to implement them in a short time. Thanks to a close cooperation it has been possible to confirm steps taken to avoid any repetition of the situation and to allow a quick resumption of spent fuel transports.

Information of the public and specific bodies

From all these events, we have also learned that even if up to now spent fuel transports were performed in Europe without much attention paid by the public, there is more and more a strong need to give on a regular basis basic information on the cask, the transport means, the regulatory framework to the public and the media. Not only when all is going well but also when some minor events not reported on time could affect as a whole the transportation activity.

Moreover, the experience for the contamination of spent fuel transport casks has revealed that a minor event, having no impact on the health of the workers and the public, well amplified by the media and the opponents has created several crisis within the nuclear worlds which affect the continuation of the transport of spent fuel within Europe. At this occasion, the proposal of the French Authority to establish an event scale for the transport incidents or accidents similar to the INES for the NPP has been welcomed by the public, the media, the industry as well as by the other competent authorities.

CONCLUSION

How big is the challenge ahead of the US Industry, it should not be overestimated: tasks of this nature and of similar size have been undertaken and an operational experience exists.

A lot of lessons have emerged from this experience, both from successful achievements or difficult situations. Taking into account the US specificity and framework, one could take advantage of the European experience.

This feedback as well as the on-going work to set up a comprehensive system will allow to be well prepared when DOE begins its spent fuel acceptance policy in a centralized storage facility expected by the utilities and the transportation actors.

How ambitious and challenging this project is, putting together all the available experience and resources will surely allow the successful development and completion of this ambitious task. We are willing to cooperate with US partners and have them benefiting of our experience.