12 FLASKTRANSPORT OF VITRIFIED HIGH LEVEL WASTE (HLW)

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INTRODUCTION

The return of HLW to Germany has started in 1996 with the first attribution of 28 glass canisters to German utilities by COGEMA. After several transports comprising 1, 2 and 6 flasks per shipment German and French Authorities requested to transport 12 flasks in a single shipment. The first of these 12-flask-transports was performed with the type CASTOR® HAW 20/28 CG flask in 2002 and the second followed in 2003. COGEMA LOGISTICS is responsible for the overall transport assigned by GNS (Gesellschaft für Nuklear-Service mbH) being itself entrusted by the German utilities with the return of reprocessing residues.

WHY A 12-FLASKTRANSPORT ?

Before describing it, we shall try to understand the background of the 12-flasktransport. The return of HLW to Germany is specific in a way that it calls a strong opposition in Germany (see picture 1). These transports are regarded by some German opponents as a symbol of the nuclear industry they are fighting. Already the first return transports in 1996 and 1997 had caused heavy and violent demonstrations with the intent to stop and to delay the trains transporting the flasks. These demonstrations took place mainly in Germany, but some light demonstrations also in France.

Picture 1 : Demonstrators on the tracks during the rail transport in Germany

Since more than one hundred flasks need to be returned to Germany, the German and French governments decided to limit the number of shipments by increasing the number of flasks per transport: 2 times a 6-flask transport in 2001 and the first 12-flasktransport in 2002. Now, the return of HLW to Germany is performed on the basis of 12 flasks in a single transport per year.

German and French Authorities have only one sensitive HLW transport per year to take care of. This means shorter employment of the police forces.

The advantages of this solution for the governments are obvious, the practical feasibility, however, was not proved at that time. The industrial parties had to adapt the standard transport organisation to this 12-flasktransport.
The feasibility of such a transport relies on :

- the interfaces between all involved parties (Authorities, railway companies, companies in nuclear industry,…),
- the extensive loading and transport documentation which is required to prove the compliance with the applicable regulations,
- the technical aspects as for example preparation and performance of the loading operations at COGEMA - La Hague facilities,
- the transport equipment e. g. flasks, railcars, trailers,… which are used,
- the communication with the public and along with this the information provided to the media.

The particularities of the 12-flasktransport compared to a standard transport are described in the following chapters for each step of the transport preparation and realisation.

LOADING OPERATIONS

The general procedure consists of the following steps :

- allocation of the vitrified residues canisters to be loaded into the flask and transported,
- final control of the vitrified residues canisters,
- loading and control of the flask,
- administrative authorisations and documentation.

Allocation of the vitrified residues canisters :

COGEMA notify the quantity of highly active waste and provide GNS with lists of canisters with the associated quality files (see picture 2). Data are available sufficiently in advance. The time schedule has been adapted to enable GNS and the German Authorities to confirm the acceptance of the attributed residues to COGEMA in compliance with the loading schedule of the 12 flasks.

Picture 2: A model of a vitrified residues canister

Final control of the vitrified residues canisters :

Several checks take place before the shipment. This is to ensure that the vitrified residues canisters meet the parameters guaranteed at the time of destorage, and can be safely transported in compliance with the international regulations. No significant adaptation has been required for the 12-flasktransport.

Loading and control of the flask :

At the COGEMA reprocessing plant destorage and loading take place at the so-called DRV facility (Vitrified Residue Destorage and Flask Loading Facility). The vitrified residues canisters selected for shipment are transferred from the interim storage pits of R7 and T7 by a special shuttle (i. e. neutron and gamma shielded) for further treatment to DRV. Then, the main steps of operation are :

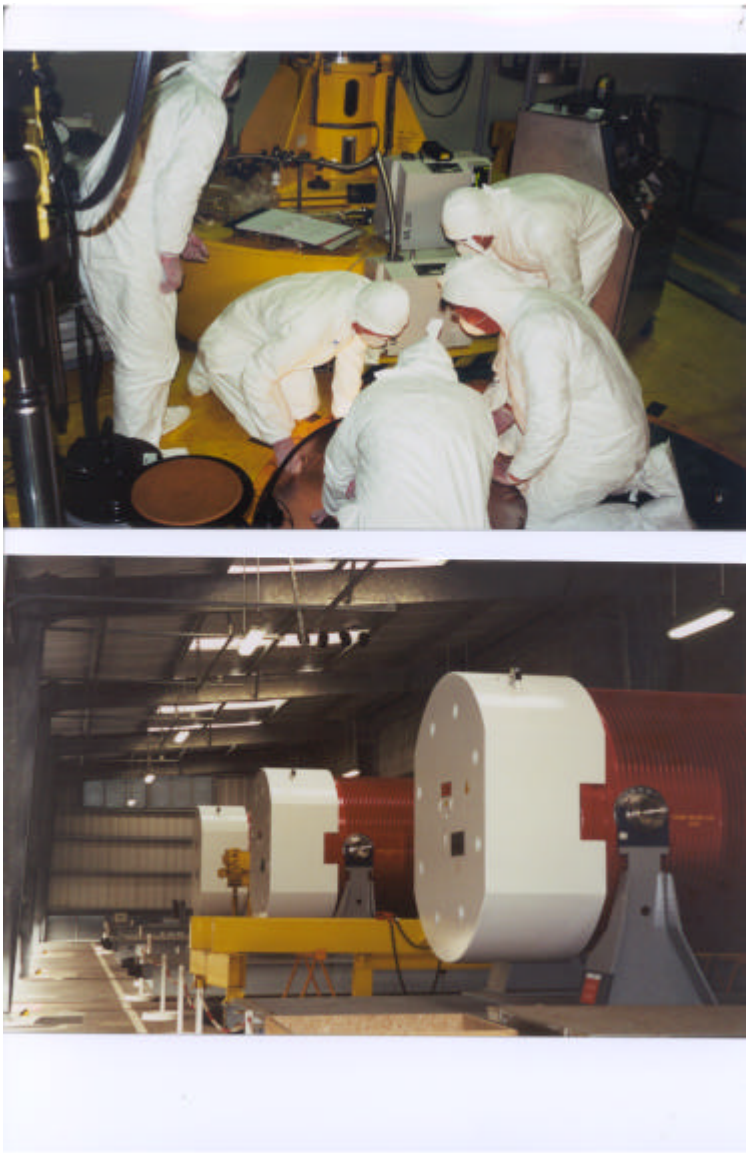
- reception of the shuttle,
- unloading of the vitrified residues canisters from the shuttle into the destorage cell,
- inspection of the vitrified residues canisters,
- reception and preparation of the flask for shipment loading of the flask in the destorage cell preparation of the flask for shipment.

The loading time windows have to be opened to all foreign customers of COGEMA (German, Japanese, Belgian, Swiss, Dutch), taking into account the individual constraints of each customer. Once the loading time windows have been fixed by the industrial parties, a transport date is agreed between the industrial parties and the governmental Authorities, taking into account a minimum period of 6 weeks between the last loading and the transport.

Focusing on the 12-flasktransport to Germany, the empty flask delivery schedule has been adapted to meet the 12-flask loading schedule. The first empty flask is delivered for loading more than one year before the transport.

No adaptation of the DRV has been required to cope with the 12-flask transport.

The on-site flasks storage capacity has been adapted end of 2001, to allow the interim storage of loaded flasks waiting for transport and empty flasks before loading (see picture 3).



Picture 3: Interim storage of HLW flasks at COGEMA - La Hague plant

Administrative authorisations and documentation :

A 12-flasktransport does not require different administrative authorisations compared to a 6-flasktransport.

The main documents for handling the flask and witnessing of GNS, independent experts and supervisory Authorities are the “Master Plan”, the “Individual Flask Handling Sequence Plan” and the “Transport Documentation File”. Together with the regulations, various test procedures and working instructions, these extensive documents form the basis of the actual proceeding of loading and transportation of a transport/storage flask of vitrified residues in Germany.

Including regulations and accompanying documents the loading and transport documentation comprises some 1 000 pages for each flask. The relevant test procedures during loading and transport call for a complex pursuance of the project and thus for a high degree of quality assurance during the entire proceeding.

The increasing number of flasks had no impact on the content of the documentation. But, it requires a more developed management of this documentation. Dedicated measures have been implemented at each step of the transport to secure the quality of the documentation.

TRANSPORT OPERATIONS

Road transport from the COGEMA plant to the French railway terminal :

The flasks that are used for these transports have a cylindrical shape. Their weight when loaded is more than 110 t. Their length is over 6.8 m.

Although the transfer of the 12 HLW flasks to the French railway terminal at Valognes is performed in the flow of other transports, it requires a specific organisation that is defined between COGEMA, COGEMA LOGISTICS and the French local Authorities. The main constraint is to be able to deliver all the flasks in a way to limit their stay at the railway terminal. No additional transport mean is required, only specific logistic measures are taken (see picture 4).

Picture 4 : Road transport of a CASTOR® flask

Operations at the French railway terminal:

Four operation steps are performed at the French railway terminal.:

- non-contamination checks by measurements on the transport equipment (flask, semi-trailer and railcars) under surveillance of German Authorities representatives,
- flask transfer from the semi-trailer to the railcars,
- dose rate measurements on the loaded railcars,
- set up of the 12-flask train before departure.

These operations are routinely performed on a daily basis over the year by the team of the terminal in co-operation with the French national railway company (SNCF) teams. But, for the 12-flasktransport, the amount of work to do in such a short period (less than 2 calendar weeks) requires altogether huge efforts. In particular, scheduling the logistic is very important. The terminal has sufficient handling and throuput capacity to handle this particularly demanding logistics. A few specific measures in the field of security are implemented during the stay of the flasks at the terminal upon request of the French Authorities.

Railway transport from the French railway terminal (Valognes) to the railway terminal in Germany (Dannenberg):

The task to handle a convoy transport of 12 flasks has a severe impact on the rail transport organisation. The challenges are:

- the train composition (in France and in Germany),
- the routes (in France and in Germany),
- the transport equipment.

In France :

The usual train composition is:

- 2 Diesel locomotives in front,
- 3 escort railcars placed at the rear and back of the train ,
- 12 Q7 railcars (for the flasks),
- 1 Diesel locomotive in the back.

The train length is about 420 m and its weight is compatible with the main rail routes in France. The transport preparation period involving the French Authorities, the SNCF and COGEMA LOGISTICS starts more than one month before the transport date.

In Germany :

At the border, the train composition is rearranged employing Railion (German Railway Company) according to the requirements of the German Authorities.
The train in Germany is usually composed of:

- 9 locomotives in total,
- 10 escort railcars,
- 2 command railcars,
- 12 Q7 railcars (for the flasks).

The train length is about 600 m and its weight is more than 2 300 t (see picture 5). The features of this train are close to the limits of the regulations. As a consequence, the selection of alternate routes for this transport is not simplified compared to the previous transports - with 6 or less flasks. These are mainly routes with difficult topographic conditions.

A thorough work has been done to identify potential routes in Germany which are compatible with the 12 flasks transport.
Additional railcars, flask supports and canopies have been made available to manage the first 12-flask transport. This additional capacity has provided the necessary flexibility in terms of scheduling and realisation.

Picture 5: 12-flask train

Operations at the German transfer station and road transport to the interim storage facility:

Unlike the case of the road transport in France that is performed in the flow of the other transports, the road transport of the 12 flasks is a very unique and specific event.

It requires a specific logistic organisation :

- delivery and preparation of the 12 tractors and semi-trailers,
- transfer of the 12 flasks from the railcars onto the semi-trailers,
- non-contamination checking by measurements on the transport equipment, dose rate measurements (flask, semi-trailer and railcars) under surveillance of German Authorities' representatives,
- road transport of the 12 flasks in one convoy.

To enable these operations and meet the requirements of the German Authorities, the transfer station required considerable modifications, such as fencing.

Additional tractors and semi-trailers equipped with frames and canopies, a sufficient number of truck drivers, escort personnel and supervisors holding the necessary qualification have been made available to manage the first 12-flask transport (see picture 6).

Picture 6 : Transfer operations at the German railway terminal

PUBLIC ACCEPTANCE

To limit the number of HLW shipments to Germany to one per year turnsthis transport into an annual event for the public. As a consequence, the actions to achieve higher public acceptance have been intensified with the goal of increased transparency :

- through the media,
- by way of various presentation and information meetings,
- by distribution of brochures,
- through the use of the internet site of the German Informationskreis Kernenergie i.e. www.kernenergie.de: during the 2002 transport week, this site and linked sites received about 45 000 contacts, 16 000 only at the day of arrival at the interim storage facility (to compare with 4 000 on a daily basis for the rest of the year).
- By making available the radiological measurements performed during the transport by the German Authorities.

AFTER THE SECOND TRANSPORT, ALREADY ROUTINE

Two transports comprising 12 flasks have already been performed. It has been shown that all the measures taken to enable a 12-flask transport were efficient and successfully managed.
While keeping the same level of professionalism, all the parties involved recognise that the organisation and the performance of this transport is becoming more and more a routine operation.

THE NEXT CHALLENGE: THE NEW GENERATION FLASKS

By the end of 2003, a little bit more thanone third of the vitrified residues canisters have been returned to Germany. In the coming years, the radiological and thermal features of the vitrified residues canisters are going to increase, because of the evolution of the fission products in the reprocessed spent fuel assemblies.
New transport/storage flasks with improved capacity are presently under development. The use of these new generation flasks induces significant modifications of the 12-flask-transport organisation. These flasks being larger than the present ones require new generation railcars specially developed for larger flasks and still compatible with rail regulations. As a consequence, the train composition shall be reviewed accordingly. In addition, new routes - especially in Germany - compatible with the increased train features shall be selected. Even if these new generation flasks won't be available before 2007, the preparation of the 12new generation flasktransport has already started…. Report at PATRAM 2010!

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