Demonstration of the Quality Assurance System for Spent-Fuel Transports

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INTRODUCTION

Transport of radioactive material (RAM) is one of the areas of the nuclear fuel cycle that attracts environmental public concerns. NTL has been working in this field for more than 20 years, mainly as a contractor of COGEMA and BNFL. These companies have appointed NTL to organize and manage spent-fuel transports and to act as their representative during handling, loading, and dispatch operations.

As yet no significant delays have been experienced during these operations. This is founded on one hand on the trustworthy collaboration between the power plant, the reprocessor, and NTL and on the other hand on the systematic and professional transport preparation based on our Quality Assurance (QA) system.

Group procedures were written and instituted by NTL about 10 years ago. These have been developed to a reliable Group QA system approved by official accreditation bodies in Great Britain, France, and Germany.

In the presentation we will expand on this QA system as well as on the measures necessary for the performance of spent-fuel transports using NTL-Hanau as a model case.

THE NTL GROUP OF COMPANIES

Scope of the NTL Group responsibilities

The NTL Group consisting of three sister companies (NTL-Risley, NTL-France, and NTL-Hanau), is responsible for the organization and management of spent-fuel transports from European power plants to the reprocessing plants of COGEMA at La Hague and BNFL at Sellafield. NTL-Risley as the holder of the transport contracts subcontracts certain transport activities to NTL-France and NTL-Hanau.

Scope of responsibilities of NTL-Hanau

NTL-Hanau has the responsibility for planning and performance of all transport-related activities in Germany within the NTL Group. NTL-Hanau also acts as the representative of the reprocessor at German power plants.

Requirements to the QA-System of NTL-Hanau

Planning and performance of spent-fuel transports in Germany are based on a number of regulations and legislations, which are summarized as follows:

- International IAEA regulations for the safe transport of RAM
- National/international regulations for the safe transport of dangerous goods
- German Atomic Law
- German physical protection requirements
- German federal state regulations and decrees
- Additional competent authorities requirements
- Rules and standards for German Nuclear Power Plants (KTA-rules)
- Package design requirements
- Requirements of the reprocessor and the power plant
- NTL Group requirements

Structure of the NTL Group QA System

All activities regarding planning and performance of spent-fuel transports are carried out within a living QA system. However, this QA system is more comprehensive than in other companies due to the international structure of the NTL Group.

Whereas the standard QA system comprises only one company manual, several company procedures, and working level documents, the NTL Group QA system includes the NTL Group QA manual, several NTL Group and company procedures, as well as several department working level documents for each company.

Specific German QA Requirements

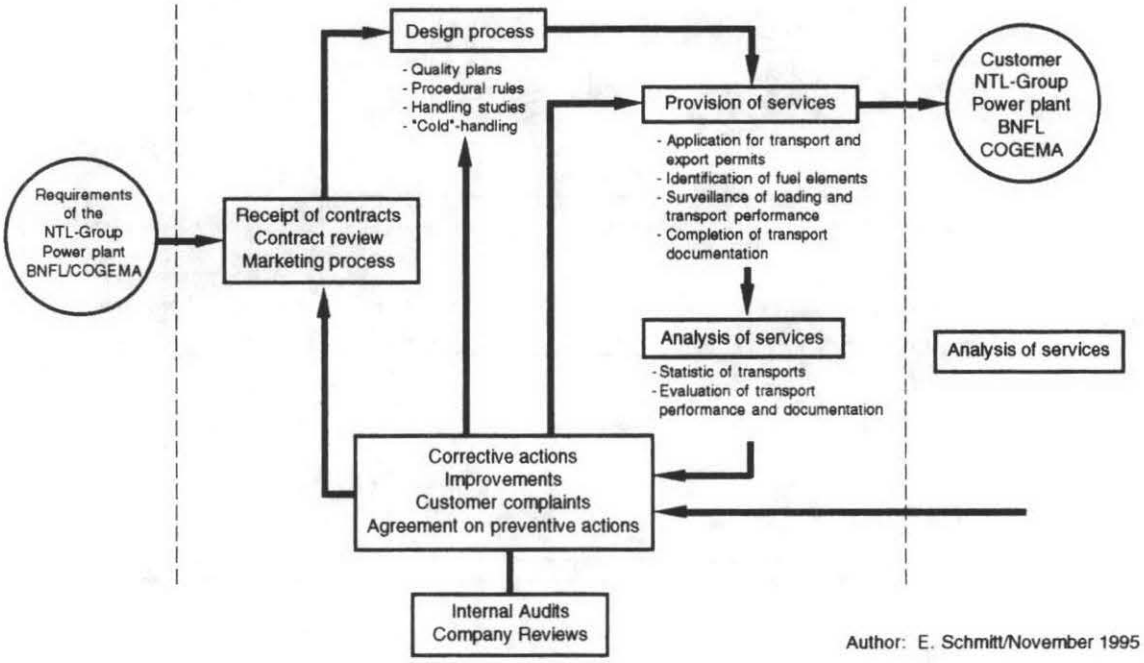
Apart from the demonstration that the QA system follows ISO 9001 and IAEA Safety Series No. 37, German power plants have to also observe the German KTA-standard no. 1401. Therefore NTL-Hanau has based its QA system on all these standards and was certified accordingly by TÜV-CERT end of 1992. Since then an annual review has been performed by TÜV-ZERT without any nonconformities. At present we are adjusting our QA system to DIN EN ISO 9001, which is scheduled to be completed by the end of this year.

Structure of the QA system for Transport Services

The QA activities for the provision of transport services are demonstrated in a quality circle, which was drafted according to DIN ISO 9004, part 2 (see Figure 1).

Figure 1.

Quality circle for transport services of NTL-Hanau



The quality circle starts with the marketing process between NTL-Hanau and its customers, which leads to the receipt of contracts and to contract reviews.

The design process, where the transport preparations are performed, follows immediately. After completion of the design process NTL-Hanau provides its transport services to the customers.

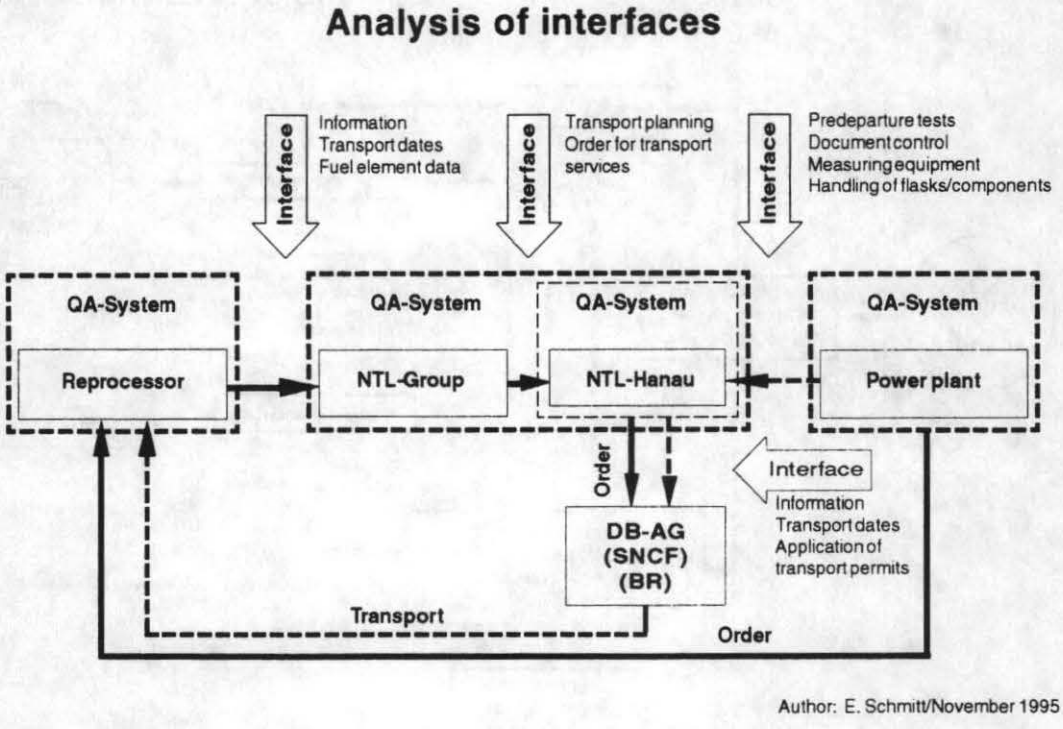
Of great importance within this quality circle are the corrective actions resulting from the analysis of services performed either by NTL-Hanau or its customers or from internal audits and company reviews, which are carried out on a continuous yearly frequency.

These corrective actions may affect the marketing process, the design process and the provision of transport services, thereby closing the quality circle, which starts again with the marketing process for new transport projects.

Analysis of Interfaces within the QA system of NTL-Hanau

Let me first explain the contractual situation (see Figure 2):

Figure 2.



The power plant places the order for transport of spent fuel with the reprocessor, who entrusts the NTL Group with the provision of these services. NTL-Risley as the holder of the contracts within the NTL Group subcontracts certain transport activities to NTL-Hanau. NTL-Hanau orders the performance of the transport from the carrier, which is the German railway company (DB-AG).

The actual delivery, however, takes place from the power plant to NTL-Hanau (that means to the technical assistant at the power plant), who will hand it over to the carrier for transport to the reprocessing plant.

This complex situation shows the importance of the interfaces between the different QA systems. These QA systems have to communicate and cooperate smoothly to avoid non-conformities.

The following interfaces are of particular importance:

- Interface between the reprocessor and the NTL Group
- Interface between the NTL Group and NTL-Hanau
- Interface between NTL-Hanau and the power plant
- Interface between NTL-Hanau and the transporter (DB-AG)

Let me demonstrate this with an example:

NTL-Hanau holds no contracts with the power plants. However, the power plants own measuring equipment which is used by our technicians during flask-handling operations. Our technicians must rely on the QA measures performed by the power plants, namely, that this equipment is regularly serviced and calibrated. This will be verified by our technicians to ensure compliance.

PREPARATION OF SHIPMENTS/TRANSPORT MANAGEMENT

NTL has developed a QA system for preparation/management of spent-fuel transports, which comprises the following requirements:

- Transport planning
- Flasks utilization planning
- Transport vehicle utilization planning
- Provision of personnel
- Qualification of transport procedures
- Organizational requirements

Only when all the above requirements are met our technicians, who act as the representative of the reprocessor, will provide technical assistance at the power plant with the following main activities:

- Loading of fuel elements after fuel element identification and burnup measurements, if required, have been completed
- Preparation of transport documentation
- Provision of advice to personnel of the power plant during flask handling based on flask handling procedures
- Performance of predeparture inspections

FLASK HANDLING / DUMMY CHECK

The before-mentioned flask-handling procedures have been qualified by a so-called cold handling, which will be performed whenever new flask types or new flasks are to be handled at the power plant.

Flask handling is described and documented in operating instructions after having tested all steps and handling procedures in a safe and reproducible manner. These operating instructions are verified and approved by the relevant competent authority. It is not until this procedure has been followed that flasks can be handled at the power plants. This proves that spent-fuel elements are only handled within approved processes.

One part within the operating instruction comprises the so-called dummy-check.

Before loading of the fuel elements for shipment, a dummy fuel element will be inserted in each position of the fuel frame to verify that the fuel elements have free passage over the whole length of the fuel frame. This is done to ensure safe loading of the fuel elements at the power plant as well as safe unloading of the fuel elements at the reprocessing plant.

FLASK LOADING REQUIREMENTS

Fuel Element Identification

Fuel element identification and traceability of fuel element numbers demonstrate one of the most important QA measures during flask loading, as loading of a false fuel element into the flask would be detected only upon unloading at the reprocessing plant.

According to the relevant NTL Group procedure, the technician at the power plant has to clearly identify and compare the identification number readable on top of the fuel element, located in a specific pond position, with the identification number on the NTL loading plan, which is masked by adhesive paper.

In practice the technician will note the pond position of the first fuel element on the loading plan, read the fuel identification number of the fuel element located in this position, and mark this number on the loading plan. Then he will remove the adhesive paper mask on the loading plan and compare both identification numbers. If both numbers are identical, approval to proceed with loading of this fuel element in the flask will be given. If these numbers are not identical, other procedures are invoked.

When all fuel elements are loaded in the flask according to the above mentioned procedure the fuel identification numbers are again checked, marked on the loading plan, and compared. Only then the flask lid will be fitted.

This procedure provides the utmost security for correct fuel element identification and loading.

Burnup Measurements Before Loading

In certain cases burnup measurements are required before loading of the fuel elements into the flask. These requirements are specified in the package approval and in the fuel acceptance criteria of the reprocessor.

Permission to load the fuel elements into the flask can only be given when the results of the burnup measurements confirm with the specified criteria.

NTL'S ROLE AS A CONSIGNOR

The technician of NTL-Hanau acting as the representative of the reprocessor is also taking over the responsibilities as the consignor of spent-fuel transports, thereby ensuring strict adherence to the applicable transport regulations.

CONCLUSION

We can now conclude that a reliable QA system represents the basis of the safe and efficient performance of transport services provided by NTL-Hanau within the NTL Group in cooperation with national and international organizations.

This QA system will be maintained by the implementation of the following measures:

- Performance of reviews
- System and product audits
- Training and qualification of personnel
- A precise QA documentation
- Assessment and surveillance of subcontractors
- Surveillance of interfaces to customers (progressive QA)
- An open information policy

In addition to these measures NTL-Hanau is striving for continuous development and optimization of its QA system. This includes but is not limited to the consideration of environmental protection philosophies like BS 7750, minimization of dose uptake during flask handling, and, most important, the specifically directed development of the QA system toward continuous improvement.