
Optimization of Irradiated Fuel Transport and Handling Achieved by Training of Nuclear Power Station Operators

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On account of the risks relevant to irradiated fuel transport between the nuclear power station and the reprocessing plant, COGEMA and the French Electricity Board have always given their strictest attention to the irradiated fuel transport regulations.

The regulations imposed by safety are guaranteed by the quality of the loading operations and the control of the convoys before their leaving. All these operations are described in long and precise operating modes.

The operators know quite well where the fuels come from, their properties, their characteristics, the equipments used for loading operations. That explains why they can easily respect the orders which are directly relevant to the handling of fuel assemblies.

On the other hand, they hardly know anything about what happens to these fuels : transport and reprocessing operations are unknown to them. A large number of loading orders are relevant to the reprocessing operations, the transport regulations, the equipments of unloading installations, the flask conception or maintenance... That is why it is difficult for them to understand the importance of some orders, thus leading, sometimes, to a false interpretation of these orders.

Moreover, the flask loading operations are not frequent tasks for these operators : they only occur three to four times a year and they are generally performed by those men who run the plant. Therefore they hardly have any training for this kind of tasks and they don't have the know-how of the operators of the reprocessing plant who daily operate discharging.

That is why COGEMA and the French Electricity Board have jointly worked out a training course for both nuclear power station operators and executives for the French Electricity Board whose target is to improve the loading operation quality. We therefore plan to increase these men's performance through a better understanding of technical unloading orders and of constraints relevant to flasks. The objective is to make people

understand the whole loading operation concept : the reason and the consequences of the different flask loading operation, and not only the way to do it.

The training course develops the following points :

- Make people understand :
 - . the reprocessing technology and proceeding,
 - . the irradiated fuel transport regulations,
 - . the flask technology and maintenance.
- Make people execute some routine maintenance operations on flasks which may occasionally be useful in nuclear power stations.
- Make people meet COGEMA specialists to exchange their know-how and to sensitize them to the specific problems of the reprocessing plant.

This training course takes place at La Hague plant and lasts eight consecutive half-days for groups of ten to twelve people.

The programme deals with the following points :

- The reprocessing technology used at La Hague plant. After a brief description of the proceeding, the attention is drawn on to all the factors relevant to the characteristics of the assemblies which cause technological or safety constraints during the reprocessing operations (criticality, cooling capacity, fuel assembly handling, shearing capacity, fissile material abundance, etc...).
- Flask structure and technology. Through a flask description, we show how their conception will assure the protection and cooling functions. We explain that the numerous kinds of reprocessed fuels at La Hague plant impose changes of internal equipments. We specify which checking key-points allow to control the flask conformity to regulations. All these points allow to justify the orders included in the loading operating modes.
- Acceptance criteria for irradiated fuel assemblies. Each criterium is explained according to its constraints. We then justify the necessity of a strict identification of each assembly.
- Visit of the railway terminal. We first show the place and then present the different operations and their constraints which are carried out there.
- Unloading operations. They are presented with the support of a video film which shows the main operations and the necessary precautions to be taken in both technologies : under water and dry unloading.

All these statements are followed by a visit which shows the unloading operators at work and thus the difficulties of their tasks.

- Flask maintenance. We explain what are the different maintenance operations on flasks, their periodicity and their constraints. A visit follows and completes this statement. The trainees are offered to practise on simple operations (such as changing a seal) which may occur in a nuclear power station.
- Key-points of unloading proceeding. This last half-day aims at understanding the relationship between the fuel loading operations / the flask preparation ones and the potential consequences. This allows to review all the different aspects which have been previously studied, finally stressing the key-points. A video film showing the main steps of the operating modes in a power station is used as a support for the course. Each loading step is commented and the consequences of a non-respect of orders are pointed out.
This training course was due to begin at the end of 1988. But some structural changes among the formation executives have delayed the experimental training course which should take place in 1989.