

Transport Procedures at ITU: Licensing and Technical Aspects

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Abstract

The transport of nuclear materials is regulated by national and international norms that have to be followed in an exact manner to assure the safety of the transport and to comply with the pertinent regulations. At the Institute for Transuranium Elements, from the licensing point of view, several regulations have to be considered, namely, The Atomic Act Licensing, the Dual-Use System and the Transport and Container-Licensing. The essential steps are briefly described. Concerning the technical aspects the handling of containers and the loading and unloading procedures in the hot cell installation and the transfer system from the entrance hot cell (β/γ -zone) to the α -zone based on a double-lid system are discussed.

1. Licensing aspects

1.1 Containers validation and transport licensing

Transport of fissile materials has to be executed according to the Atomic Act and to ADR-regulations. The container for the transport has to be validated and certified:

- In the country of origin of the container
- In the country of departure of the transport
- In each country the transport has to pass by, and
- In the country of arrival of the transport

In Germany the nuclear cargo enterprise in charge of the transport has to formulate a demand by the Bundesamt für Strahlenschutz (BfS), providing all the technical and radiological relevant information and safety documentation together with the original certification of the container. With this information, the BfS demands the technical advice of Bundesamt für Materialforschung (BAM), which usually makes recommendations. On the basis of the BAM-recommendations, the BfS issues the validation of the transport container and grants the transport licensing according to the ADR-regulations and transport licensing consistent with the § 4 of the Atomic Act.

This procedure has to be followed in each land through which the transport has to pass through, in accordance with the local regulations.

1.2 Export and import licenses

1.2.1. Atomic Act (AtG) (export and import)

For each importation or exportation of more than 15 g of fissile material, one license according to the §3 AtG (Atomgesetz, Germany) is necessary. The demand of this license is made by ITU to the BAFA (Bundesamt für Wirtschaft und Ausfuhrkontrolle). The demand must contain:

- The description of the material to be transported
- The quantity of the fissile material and its isotopic composition,
- The material delivery note

1.2.2 Dual-Use System licensing (exportation)

For the exportation of radioactive material, the Dual Use System Licence is necessary:

- Outside of the European Union: for each quantity of Uranium and / or Plutonium to be transported.
- Inside of the EU: by separated Plutonium or enriched Uranium with more than 20 % enrichment.

1.2.3 Customs regulation (outside of the EU)

Before any transfer of radioactive material outside the country, if a license of exportation is necessary, a declaration of exportation is to be made by the customs-office. If there is no license needed, a registration of the exportation by the customs-office is enough.

In conclusion it can be said that the organisation of a transport of radioactive material is a long and cumbersome procedure. It is important to have the whole and correct information just before the beginning of the procedure of the transport licensing. According to our experience, it is usually difficult to prospect predict a precise date for a transport because of the reliance on licensing authorities and on the momentarily political situation.

2. Technical aspects of the transport of irradiated fuel rods at ITU

The technical aspects of the transport of irradiated fuel rods (FR) at the Institute for Transuranium Elements are mainly related to the technical features of the installation (see Fig. 1). The installation is divided in two main groups of hot cells: on one side the α -hot cells comprising, besides the β/χ -shielding, an α -tight box whereas the entrance hot cell, HC-101, is a β/χ -zone where no α -open source is admitted.

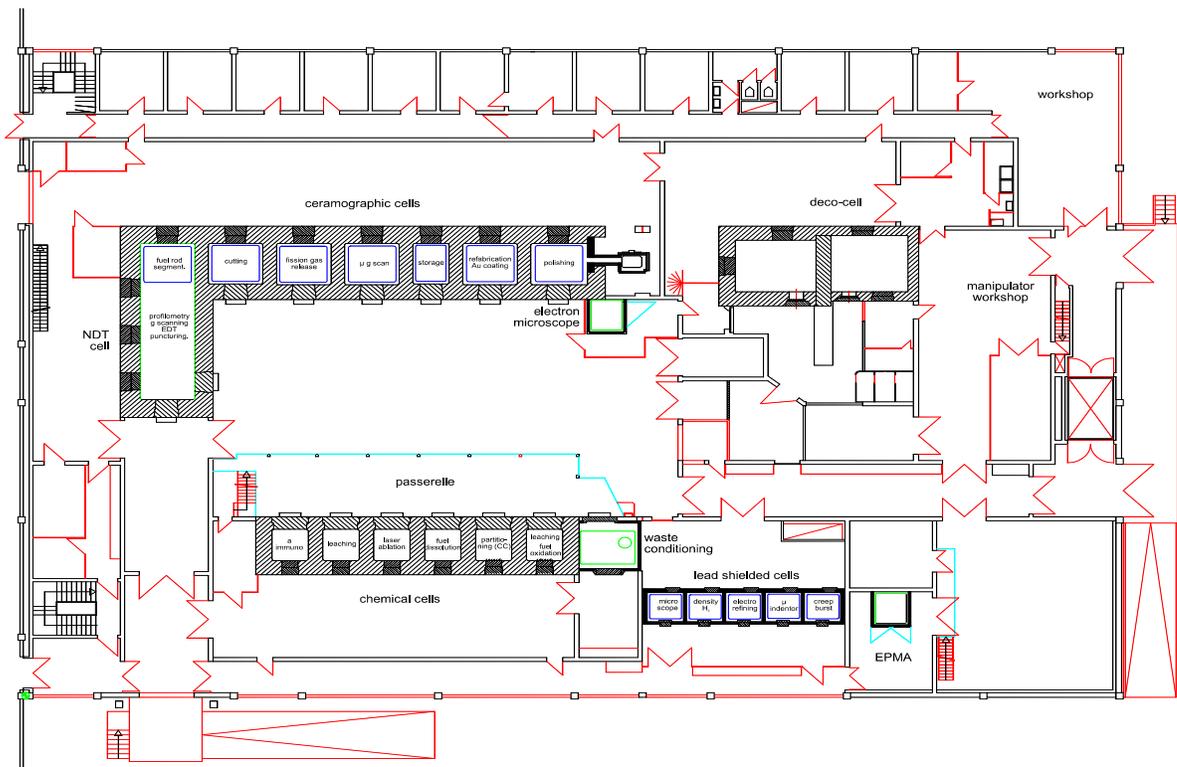


FIGURE 1: Institute for Transuranium Elements, hot cell installation

The transport itself is performed, using licensed containers as described above, transported in vans up to the ramp in front of the installation. There a heavy crane (up to 40 tons) can unload the container to a heavy-duty conveyor, which, over rails, can transfer the container to the entrance hot cell. There the container is coupled to the loading port (see Fig. 2), which remain closed until the α -tight connection has been performed. After that the loading port may be opened and the quiver containing the fuel rods can be slid into the hot cell and, then, the fuel rods can be discharged into the hot cell.

The entrance hot cell is, at the same time, dedicated to two important functions: to perform the non-destructive analysis (NDA) and the storage of the irradiated fuel rods until the NDAs analyses have been completed.

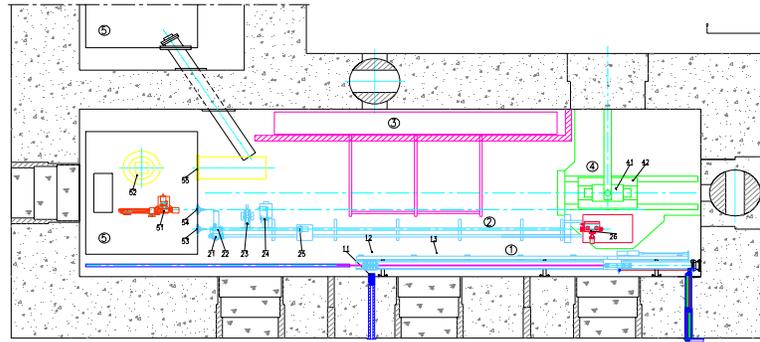


FIGURE 2: Entrance hot cell

The entrance hot cell is, at the same time, dedicated to two important functions: to perform the non-destructive analysis (NDA) and the storage of the irradiated fuel rods until the NDAs have been completed.

After having performed the NDA, the FR hadve to be transferred to the α -zone for the cutting of samples to perform the destructive analysis. Several possibilities are foreseen in the installation for transfers between the two zones and internally in the α -zone:

- i) a transversal connection for fuel bundles up to 100 mm in diameter
- ii) a magnetic conveyor along the two lines of α -tight boxes
- iii) a pneumatic system between the metallurgical hot cells and the chemical and small hot cells, and
- iv) two La Calehne doble-lid connections between the hot cell 101, β/γ -zone and the α -tight box

The La Calehne connections are for the fuel rods the way into the α -zone, after segmentation and cutting of the needed samples, as well as the way out of it of the fuel rod remnants. In fact, after having performed the destructive analysis, the fuel rods have to be re-encapsulated for the back transport to the reactor pool. After having performed the destructive analyses, the FR-remnants are introduced into a capsule, having a diameter slightly bigger than the original FR and, after He-filling, these capsules are welded shut for the back transfer to the reactor pool.