

**Completed Decommissioning of the Research Reactor TRIGA Heidelberg**  
**We are specialised in Decommissioning a Research Reactor in Germany now!**

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**ABSTRACT**

This paper describes the decommissioning of the TRIGA Heidelberg II reactor which was used until 1999, and of the TRIGA Heidelberg I reactor, which was for the last 20 years in a safe containment.

**TRIGA HEIDELBERG HD II**

The decommissioning of the TRIGA Heidelberg II reactor and the measurement for unrestricted release from the Atomic act is finished. Figure 1 shows the initial situation in 2002 and Figure 2 shows the final state in 2005 with the rest of the biological shield.



Fig. 1. Initial situation in 2002



Fig. 2. Final state in 2005

The reactor was in operation from 1966 to the end of 1999 for research tasks in oncology and cancer research.

The first step after final shut down was the return shipment of the spent fuel to the country of origin, the USA. Within the operation license this was done under a very hard time pressure and it was not easy to get all the permits for the transport.

It was difficult to find qualified casks and proven equipment for the fuel and for the Fuel Follower Control Rods (FFCR) and as well the coordination for the transport to the USA with other users. Another great problem was to get these casks qualified with the content of activity by the different governments.

There were many requirements of the German and the European authorities and even of the American National Regulatory Commission to fulfill.

We had to prepare the building and especially we had to support the gallery near the truck door because of the weight of the casks. We wrote a safety report for the handling of the casks and the fuel, and we described all steps of the handling. We had to procure and engineer tools such as loading units, transfer cask and a gripper for the loading units.

At the same time we had to make the applications for the permit to handle the fuel and for the transport license within Germany, on the Ocean and in several states of the USA.

A huge effort was caused by all the commercial requirements in Germany and in the European Union.

The second step and more difficult part of the decommissioning was the dismantling of all components and the peripheric systems and even the administration in Germany. Before we made the proposal we had to publicize this action, to evaluate the offers and to agree with a decommissioning company about the dismantling methods. Then we made an environmental impact statement with a description of the facility and the decommissioning steps in Germany and all European countries.

By a notice of change within the operation, we made some preparatory works:

1. Modification of the controlled area entrance, building airlocks. Modification of the entrances to the adjacent Cyclotron. Container lock for loading the trucks.
2. Separation of the spent air flow between reactor and cyclotron hall.
3. Implementation of several measurement equipments for the radiological survey (monitoring the air flows).
4. Mobile air condition equipments for the use of several containments.

While we were performing all these steps, we had to prepare the following supporting documents for the license of decommissioning:

- Safety Report.
- Environmental Impact Statement.
- EURATOM Report (Environmental Impact on European Neighbours) . License for disposal of radioactive waste.
- Description of each step of the decommissioning performance.
- Adaptation of the user manual for the operating time for the period of decommissioning.

When the decommissioning license was received in September 2004, it was very detailed and we got many requirements.

The real decommissioning and the dismantling of the components started right after receiving the license in the following main steps:

- dismantling the peripheral components in the reactor hall.
- dismantling the core
- dismantling the fittings in the engine room.
- dismantling the reactor tank.
- dismantling the biological shield.
- measurement for unrestricted release.

and now one year later it is all done.

The dismantling and take out of the radioactive core components was the most important act. The core was packed in a special shielded cask and transported to the long-term storage in the Research Center of Karlsruhe. Then the cooling systems and the connected pipes and the laboratories were dismantled. After that we installed a containment for the dismantling of the reactor tank and the biological shield. The reactor tank was dismantled by sawing and the biological shield by hydraulic splitting.

Decontamination and measuring for unrestricted release and exemption will be done in November 2005 and the unrestricted release of the building and the left equipments will hopefully completed in February or March 2006.

### **TRIGA HEIDELBERG HD I**

In the meanwhile we had to dismantle the rest of the former reactor facility, the TRIGA Heidelberg I, that was in a safe containment for 20 years. After the decommissioning in 1985 there were just the reactor tank and the bioshield left. To dismantle these components, we made a very simple containment with an air conditioning system. After the unrestricted release of the reactor area according to Atomic Act the building will be removed and the area will become a green field.

The conditioning and separation of mixed waste will be done in the Department of Decontamination (HDB) in the Research Center of Karlsruhe. All the radioactive waste is deposited in the long term storage of the State of Baden-Wurttemberg.

The non-active waste will be measured by a special measuring equipment for unrestricted release.

The complete decommissioning work and the release according to Atomic Act by the authority will be done at the beginning of the year 2006.