

Licensing Process For Decommissioning Low Flux Reactor Petten - 14490

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ABSTRACT

The Low Flux Reactor (LFR) is a small nuclear research reactor with a thermal power of up to 30 kW located in Petten, The Netherlands. Since 1960, the LFR has been used for research and educational purposes. As of December 2010, the operations of the Low Flux Reactor (LFR) stopped.

In 2011 the decommissioning of the LFR has started with the preparations for the license application for decommissioning license, which was filed in the last quarter 2013. This was the first decommissioning license in the Netherlands. Which made it sometimes a discovery process of what should be and should not be in the license documents.

Further preparations continue to start the execution of the decommissioning in 2014, with writing the Safety and ALARA management plans, the working and the working plans for the different dismantling steps.

An overview will be given of the licencing process, including the lessons learned, and how the decommissioning will be performed. Also the Safety and ALARA management of the decommissioning will be discussed.

INTRODUCTION

In the history of the Netherlands, three small research and experimental reactors have been decommissioned (Athena, BARN and KSTR, reactors) in the 1970's and 1980's. For these a decommissioning license according to the old standards was needed. The in 2010 stopped LFR reactor needs, according to the Dutch law, a decommissioning license and environmental impact analyses according to today's standards.

The licensing process was started in September 2011 with writing a document in which a description was given of our plans, and alternatives to the plan, and this was published for the public. Upon this document the Environmental Impact Analysis committee prescribed which information needed to be given, and in which detail, in the Environmental Impact Analyses. A license application for decommissioning in the Netherlands consists of several documents:

- a) Safety report
- b) Decommissioning plan
- c) Environmental Impact Analyses
- d) Financial Security
- e) License application letter

Next to the license application documents additional documents might be asked for by the authorities to help them judge the license application. After the license application has been applied the authorities will judge the documents and when it satisfies the needs the decommissioning license will be published for the public in such a way the public has the possibility to make any objections. The objections given by the public (if any) will be judged by the authorities and if needed the licensee has to give additional information, or make changes to the applied license. If the supplied information and documents are approved by the authorities the decommissioning license will be provided to the applicant. After this, the final license will be published, and the public has 6 weeks to make objections, after this period the license is granted and the decommissioning can start. The fuel of the reactor was removed under the operational license and is not part of the decommissioning.

DESCRIPTION

Method

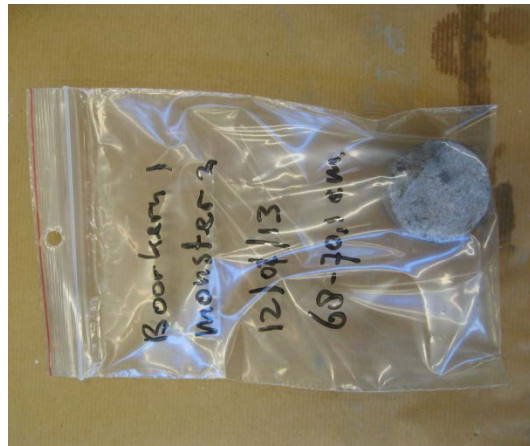
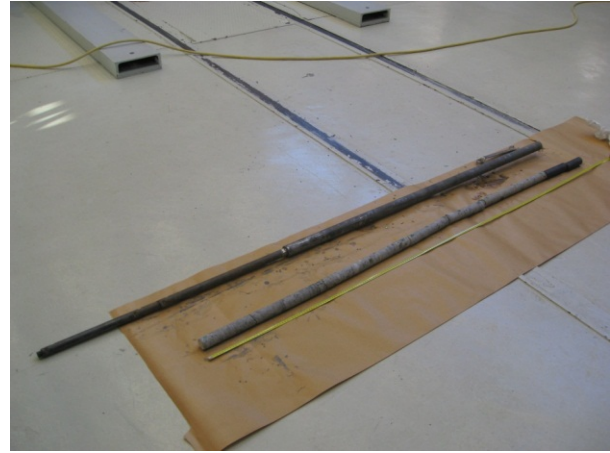
Before starting making agreements on the procedure to apply for the decommissioning license the people involved at the authorities with the license application were invited at NRG to visit the Low Flux Reactor so that the reactor was known to them and the potential risks could be discussed.

In this first license application, according to new regulations, for decommissioning we agreed with the authorities to submit two times a draft set of documents before sending the official license application. This was done because both the authorities and NRG did not have any experience in applying for a decommissioning license.

Results

In October 2012 the first set of draft documents was send to the authorities for review. The aim of this draft set for NRG was to find out if we had supplied the right information, with the right amount of detail, in such a way we would get a decommissioning license. The aim for the authorities was to check whether the supplied information was complete and detailed enough to be able to judge the license application.

After the evaluation of the first draft set, it appeared that more (detailed) information was needed. For example, more detailed information upon the inventory of the decommissioning waste was needed. To be able to give more information many measurements have been performed and drill cores were taken from the biological shield, graphite reflector and foundation of the reactor (see figure 1-4). The drill cores were taken at both sides of the reactor core, it was expected that these sides would have been activated differently since the fuel had been placed mainly at one side of the core during operation. Another drill core was taken though the foundation of the reactor.



The concrete and graphite samples were measured with gamma-spectrometry and from the results it appeared that the material at a distance of approximately 150 cm from the core will be radioactive waste and the rest of the material can be released as conventional waste. The detected nuclides were Co-60, Ba-133, Eu-152 and Eu-154. An example of the results of 1 of the taken drill core is given in table 1.

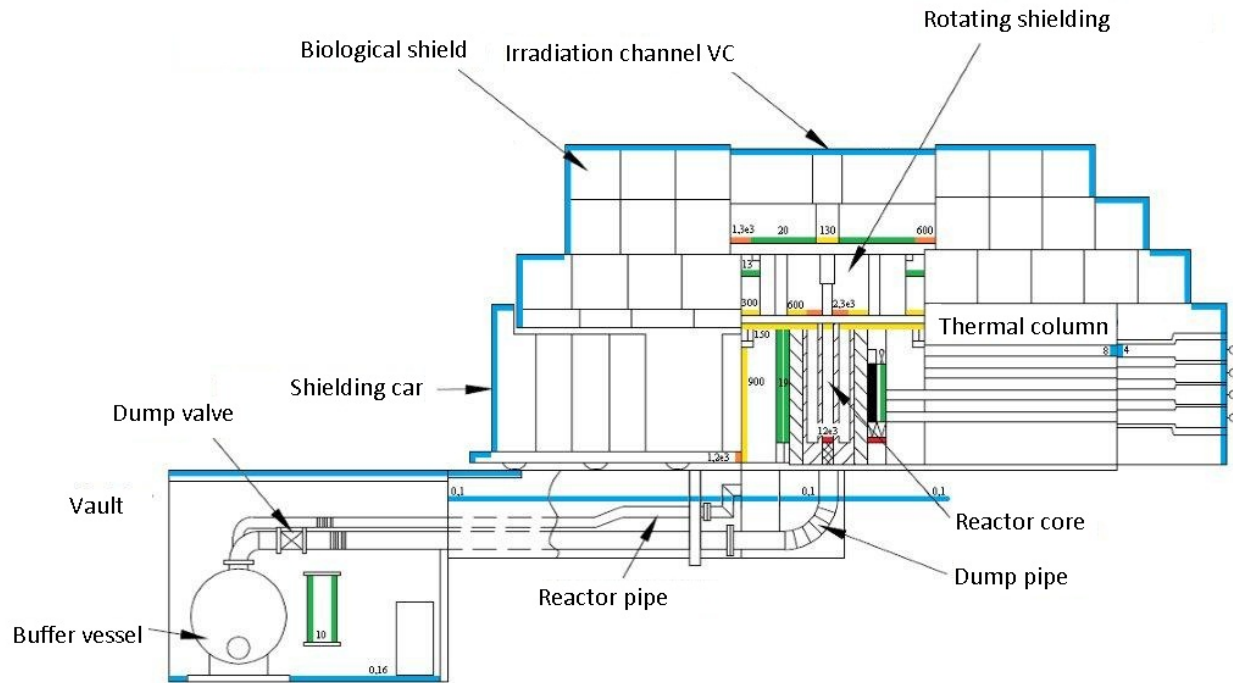


Figure 2: Cross section of the reactor with the measured dose rates (in microSv/h)

Dose rate ($\mu\text{Sv/h}$) at 0,25 m:	
$x < 10$	Blue
$10 \leq x < 100$	Green
$100 \leq x < 1000$	Yellow
$1000 \leq x < 10000$	Orange
$10000 \leq x$	Red

Eventually 2 more draft sets of the license application were supplied to the authorities before the official application was performed. Next to the documents for the license additionally, a supporting document to the safety report, an ALARA and also a SHE plan were provided to the authorities on their request. This information was needed to be able to give a good judgment of the license documents.

The official license application was submitted in the last quarter of 2013.

DISCUSSION, e.g., of Method(s) and Results (S).

Performing a decommissioning license application according to new legislation and with officials who have never had to do with such an application time is needed to discuss and clear agreements have to be made with all the persons involved in the approval of the documents both at the authorities and within the organization of the license applicant.

Another lesson learned is one should try to keep the same people in the team, it appeared that different people interpret the legal requirements differently which might result in additional and re-work on the documents.

CONCLUSIONS

Applying for a decommissioning license for the first time with new legislation takes quite some time and discussion with the authorities on what should be delivered in which detail. On the other hand it forced NRG to do more measurement upfront, which resulted in a better decommissioning plan.

The waste from decommissioning the LFR will probably only be low level waste.