

### Background

The BR2 is still [SCK•CEN](#)'s most important nuclear facility. After an extensive refurbishment of 22 months to compensate for the ageing of the installations, to enhance the reliability of operation and to comply with modern safety standards, it was restarted in April 1997. The facility is mainly used for the irradiation and testing of fuels and materials and for commercial productions – including radioisotopes for the medical and industrial uses, and NTD-Silicon.

### Objectives

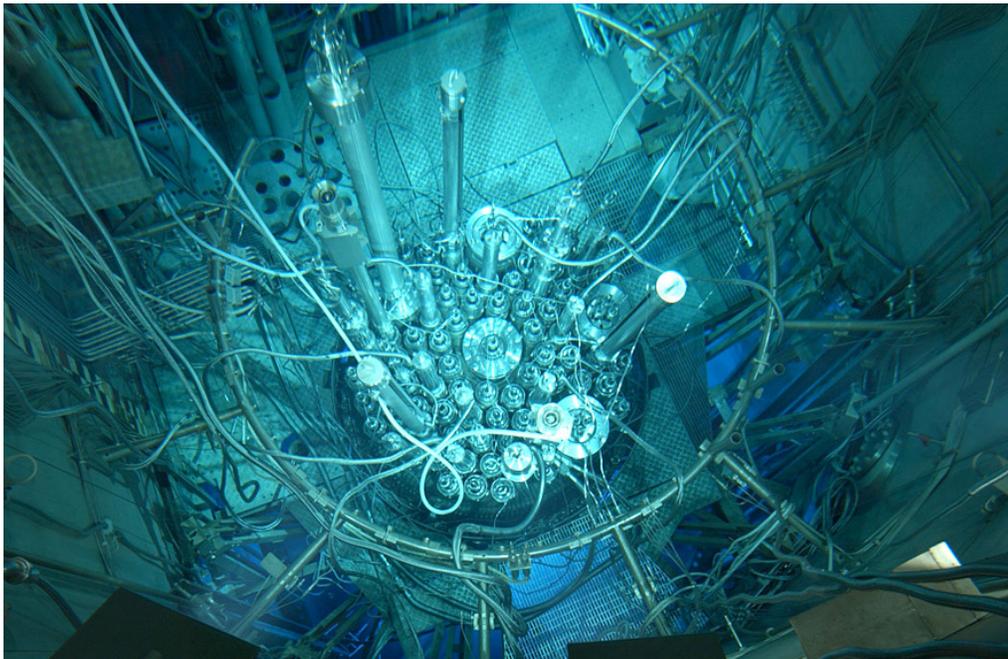
To keep the reactor facility available for the scientific irradiation programmes and commercial productions along the whole predefined operation schedule, while maintaining safety during operation as the top priority.

### Principal results

The reactor was operated for 125 days at the mean power level of 52 MWth. The normal operation period was extended for two weeks for the production of radioisotopes for the radiopharmaceutical industry. Two complementary low power runs were also organized for the RIED experiment.

The reactor was operated with an average availability of 93.59 % (time at power over scheduled time at power). Two interruptions of operation, totalling 5 days, were recorded due to failures of fuel rods in the OMICO experiment. Another two days interruption of the operation was due to a failure on the external electrical distribution network.

The Board of Directors approved the extension of the operating schedule to a sixth cycle, starting from 2006, on production of a detailed business plan.



*Top View of the Reactor Vessel*

| Plant Operation Data Plant Operation Data |                |
|-------------------------------------------|----------------|
| Year                                      | Availability % |
| 1998                                      | 99,94          |
| 1999                                      | 99,97          |
| 2000                                      | 93,05          |
| 2001                                      | 96,15          |
| 2002                                      | 100,00         |
| 2003                                      | 97,81          |
| 2004                                      | 96,65          |
| 2005                                      | 93,59          |

Routine maintenance activities and inspections during the scheduled shutdowns guarantee the continued safe and reliable operation of the facility and provide the basis for a secure long-term future. Previous recurrent problems on control rod drive mechanisms were fixed by systematic control and replacement of critical components. Tests on new control rod drive mechanisms are still foreseen in 2006.

We started a new project aiming at the replacement of the primary pumps of the Callisto loop. The objective is to have the new pumps in operation in 2007.

A first full batch of high density fuel elements with a reduced (73%) enrichment was received on site and is being irradiated successfully. A second and last order was placed for delivery in 2006.

We introduced a request to the USNRC for procurement of HEU. This request is motivated by the absence of adequate and qualified LEU fuel still for some years from now and the commitment of SCK•CEN to operate the facility until at least 2016.

After the approval of an action plan in the frame of the 2006 decennial safety re-evaluation we worked on the definition of the different tasks and their planning. The main objective is to guarantee the operational safety and the reliability of the facility until at least 2016.

#### Future developments

For 2006, we foresee:

- a standard operation schedule with an extra week of operation for the cycles 02 and 04/2006;
- various maintenance activities aiming at maintaining a secure and reliable operation;
- two transports of spent fuel elements to Cogema-La Hague;
- various activities (studies, inspections, maintenance...) as foreseen in our action plan in the frame of the 2006 decennial safety re-evaluation.

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#### Main reference

E. Koonen, F. Joppen, P. Gubel, "Safety challenges encountered during the operating life of the almost 40 years old research reactor BR2", IAEA-CN-82: International Conference on Topical Issues in Nuclear Safety, 3-6 September 2001, Vienna, Austria.