

DE LA RECHERCHE À L'INDUSTRIE

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Highlights of French Research Reactor Operation **2018**

RROG MEETING Mainz

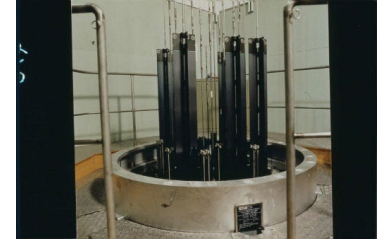
May 14th-16th 2019

AZUR:

The year 2018 has been devoted to :

- The core acceptance testing for the French Navy's nuclear-powered vessels,
- The training and qualifying of TECHNICATOM personnel to operate the facility
- The training of French navy personnel on reactor operations.

500 divergences over 130 days of nuclear operations

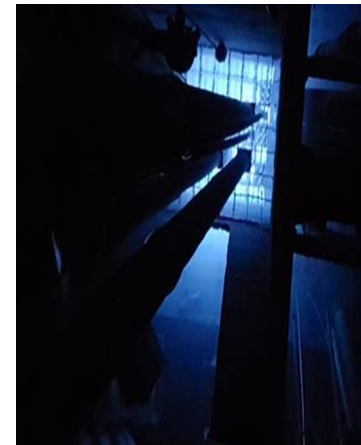


ISIS (definitively shutdown)

A total of 66 days of operation, which enabled 28 practical work sessions with about 200 trainees and 26 days of irradiation experiments. These experiments involved the irradiation of Co^{59} micro-particles, the qualification of large dynamic detectors for the PWR, and the irradiation of optic fiber devoted to the measurements of stress and temperature in the PWR basement..

There were also 9 days of operation for in-house actions, such as service tests and verification of safety parameters.

The year 2018 has been the ultimate year of operation of ISIS which has been definitively shutdown the December 21st 2018.



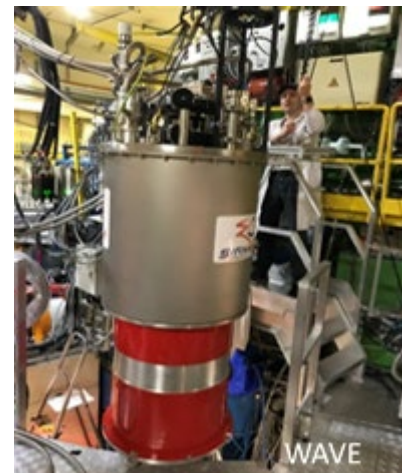
ORPHEE

A total of 119 days of operation. The reactor produced 868 kilos of doped silicon and 26 tubes of artificial radioelements.

The file on the preparatory works for the dismantling has been submitted to the safety Authority

The Léon Brillouin laboratory conducted a large number of experiments, including experiments on the neutron diffraction and on the neutron inelastic diffusion by using a new vector magnet call 'Waves' for the determination of complex magnetic structures.

The Final shutdown of the reactor is programmed for the end of 2019

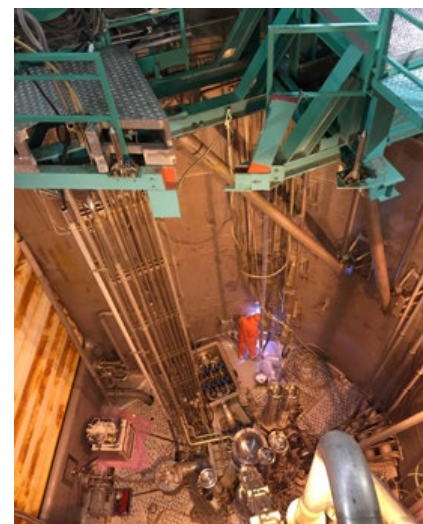


HFR- ILL Grenoble

Three reactor cycles were completed in 2018, using three fuel elements and providing a total of 152 days of scientific activity.

The post-Fukushima program has been completed.

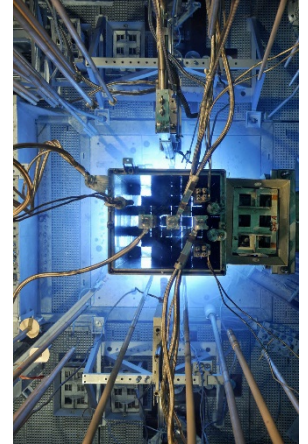
At the end of 2018 the last set of documents for the ten-yearly safety review, has been submitted to the Safety Authorities



OSIRIS (definitively shutdown)

The year 2018 has been the 3rd year following the final shutdown of the OSIRIS reactor. It allows the realization of preparatory works for the dismantling.

This year has also been mainly devoted to the studies and examinations lead in the field of the ten-yearly safety review of the reactor, and to the preparation of the set of documents for the dismantling file which will be submitted to the safety Authority.



PHENIX (definitively shutdown)

In the field of the dismantling of the reactor many operation allowing the reduction of the source term has been carried out such as:

- The evacuation of all the mechanism of the control bar.
- The evacuation of 25 irradiated fuel assemblies after hot cell reconditioning.
- The finalization of the treatment of the G intermediate heat exchanger, which involved perforating and removing the caps

We can note also the coupling of the new sodium treatment facility, NOAH to the reactor building

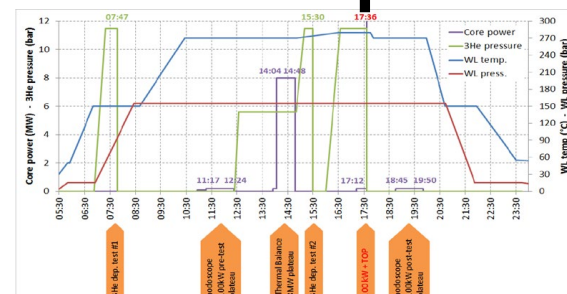
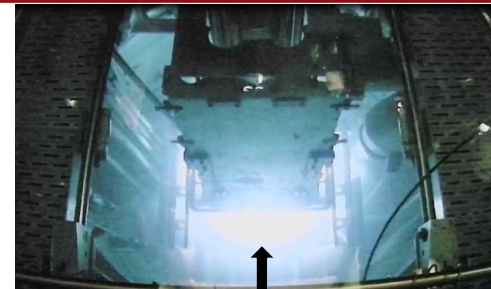


CABRI

After many years of refurbishment and requalification the 2018 year saw the back to experimental stage of CABRI. After obtaining at the beginning of the year the official safety authorisation for running the CABRI experimental Program (CIP) devoted to RIA studies on Uox and Mox fuel, the first test of this program has been performed the April 16th 2018. This test 'CABRI-CIPQ' has been a real success as for the technical performance than for the human point of view.

PHEBUS (definitively shutdown)

In 2018 the operations to reduce the source term in the facility were continued, by the dismantling of the secondary cooling circuit of the reactor. The operation in preparation of the evacuation of the irradiated fuel have also been carried out. The year 2018 also saw the application of the safety review by the realization of a first set of modification to fulfil the safety commitments. In parallel the the dismantling file has been submitted to the safety authority

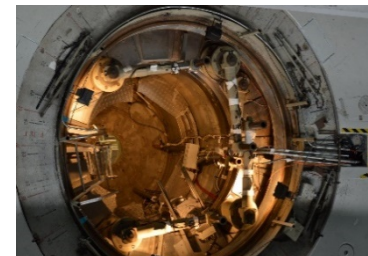


EOLE (definitively shutdown) and MINERVE (definitively shutdown)

Following the definitive shutdown of the EOLE and MINERVE reactors, the dismantling phase has been started.

The main highlights of 2018 are the following:

- Reduction of source term by : dis-loading all the fuel elements of each reactor ; Evacuation of the water of each reactor ; Disassembly of the experimental lattice structure ; Evacuation of the neutron sources ; Start of the evacuation of different radioactive materials (reduction of the environmental impact)
- Submission of the safety review file and of the dismantling file to the safety authority



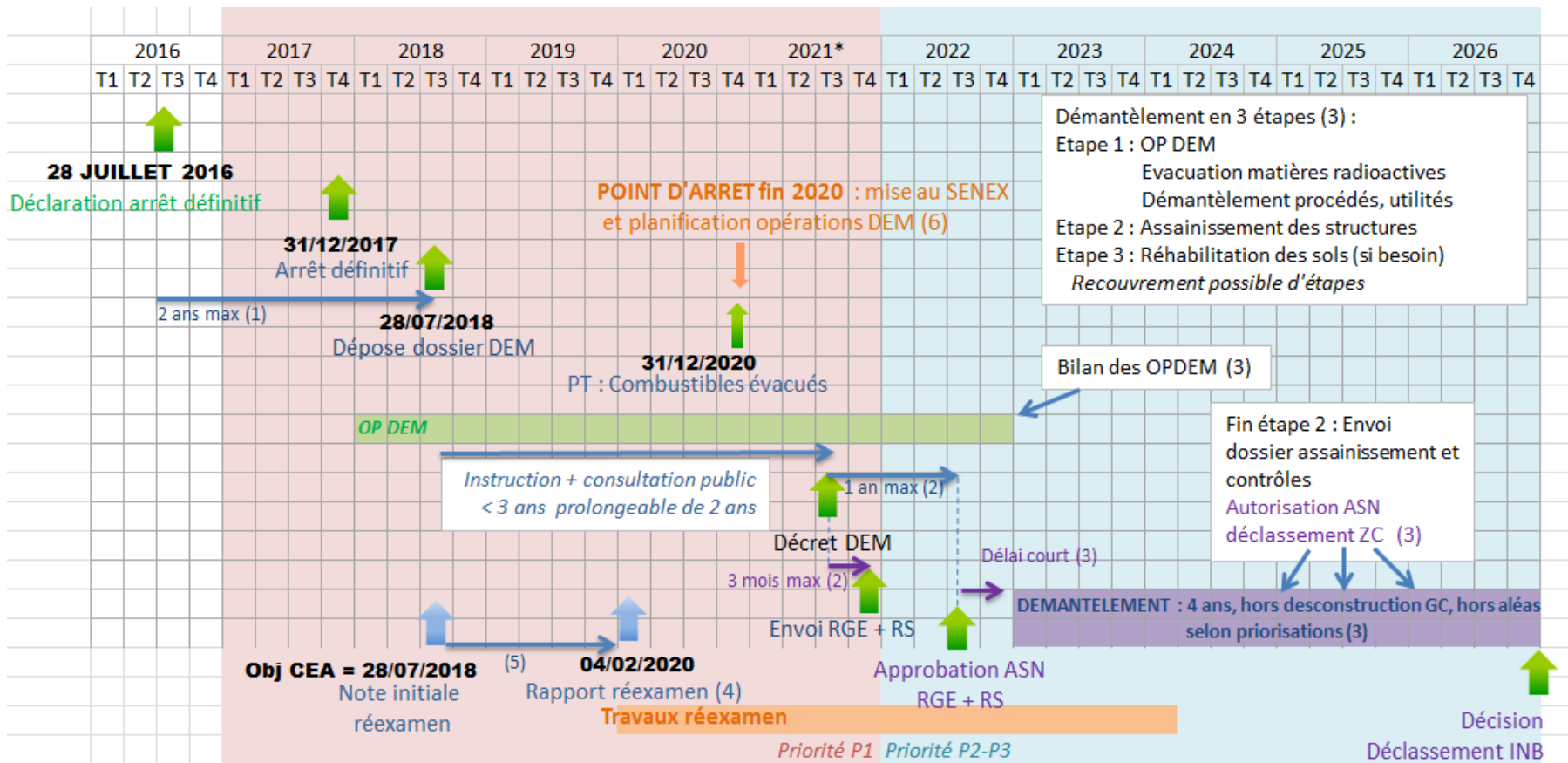
MASURCA (definitively shutdown)

Due to the uncertainties around the need for a future Fast neutron Reactor (ASTRID type), it has been decided to stop the refurbishing program of the MASURCA reactor. This decision has led to the final shutdown of the reactor in December 2018.

The year was consequently devoted to the preparation of the dismantling file and to the realization of preparatory work for the dismantling of the reactor such as the replacement or dismantling of equipment or walls contaminated by asbestos.



DISMANTLING PHASE OF EOLE AND MINERVE REACTORS



- (1) Code de l'environnement
- (2) Décret procédure 2016-846 du 28/06/2016
- (3) Plan démantèlement Eole Minerve SPEX/L2EM/NT/16/023 ind A
- (4) Lettre MSNR 2016-118 DU 29/08/2016
- (5) 3 ans dans projet de décision ASN sur les réexamens
- (6) Dossier de priorisation du 16/12/2016
- * Hypothèse = obtention décret de DEM en T3 2021

RES

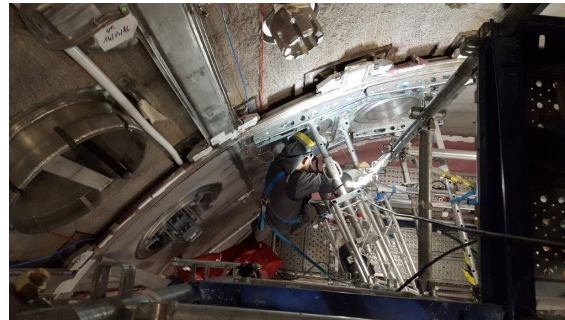
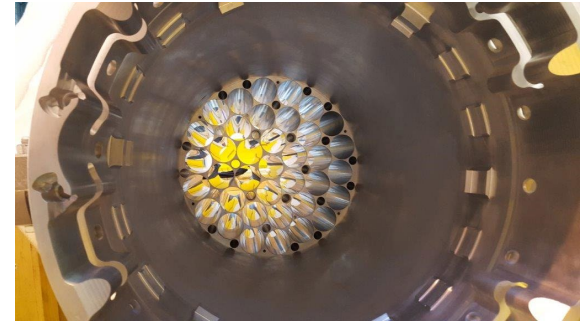
The highlight of 2018 are considering :

- ❑ The end of the steam tests and the clean-up of the circuits,
- ❑ The end of the functional tests together with the achievement of the training of the operators),
- ❑ The dis-loading of the 'Dummy Test Core'
- ❑ The loading of start-up Core 'R1' from May 21st 2018 and the performing of the Hydraulic tightness tests for the primary and secondary circuit
- ❑ **The Start-up of the R1 core the October 10th 2018,**
- ❑ The start of the zero power tests 'HIPPOCAMPE program'. The main goal of this program is the precise characterization of the physical parameters of the core:
 - Absorber efficiency
 - Power distribution
 - Temperature and pressure effect
 - Boron concentration effect



JHR

See the specific presentation



ZEPHYR

Definition of the future facility was continued throughout the year. Partnerships with French and foreign organisations were actively pursued. Numerous scientific seminars in France and overseas were organised

