

DECOMMISSIONING OF SALASPILS NUCLEAR REACTOR



XA0202917

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Abstract. In May 1995, the Latvian Government decided to shut down the Research Reactor Salaspils (SRR) and to dispense with nuclear energy in future. The reactor has been out of operation since July 1998. A conceptual study for the decommissioning of SRR has been carried out by Noell-KRC-Energie- und Umwelttechnik GmbH from 1998-1999. The Latvian Government decided on 26 October 1999 to start the direct dismantling to "green field" in 2001. The results of decommissioning and dismantling performed in 1999 - 2001 are presented and discussed. The main efforts were devoted to collecting and conditioning "historical" radioactive waste from different storages outside and inside the reactor hall. All radioactive material more than 20 tons were conditioned in concrete containers for disposal in the radioactive waste depository "Radons" in the Baldone site. Personal protective and radiation measurement equipment was upgraded significantly. All non-radioactive equipment and material outside the reactor buildings were free-released and dismantled for reuse or conventional disposal. Weakly contaminated material from the reactor hall was collected and removed for free-release measurements. The technology of dismantling of the reactor's systems, i.e. second cooling circuit, zero power reactors and equipment, is discussed in the paper.

INTRODUCTION

The research reactor IRT in the Salaspils site near Riga, the capital of Latvia, was put into operation in September 1961. The research reactor was originally built according to former USSR design as a pool type light water-water reactor with nominal thermal power 2 MW.

Since 1975, after physical reconstruction of the reactor, the nominal thermal power of the reactor was increased to 5 MW.

On 16 May 1995, the Cabinet of Ministers decided, in the Order No. 263, to shut down the Salaspils Research Reactor (SRR) after 2 years of operation (the decision prohibited obtaining fresh nuclear fuel) and requested the Nuclear Research Centre of the Latvian Academy of Sciences to start the preparation of the concept for decommissioning. The operation license for SRR was valid until end of 1999.

A proposal for a technical co-operation project on decommissioning the research reactor was submitted to IAEA for the years 1997/1998. Five expert missions were organized by the IAEA between July 1997 and June 1998. According to the Order of Ministry of Environmental Protection and Regional Development of 12 January 1998, a steering group was set up for the promotion of Salaspils NRC reorganisation and reactor decommissioning studies.

On 19 June 1998, the reactor was put out of operation and some assemblies were removed from the core. The Salaspils NRC was in control of the Ministry of Education and Science up to 1 January 1999. According to the decision of Government of Latvia, the Salaspils NRC was to be reorganised by 1 January 1999 into Reaktors Ltd., units of University of Latvia and Laboratory of Metrology. As of 2001 Reaktors Ltd. was reorganized in RAPA, Ltd.

The firm PREUSSAG NOELL started the Salaspils NRC decommissioning and dismantling conception studies in July 1998. The results of the studies [1, 2] were presented on March 10 at the Ministry of Environmental Protection and Regional Development (MEPRD). The concepts were the basis for the Order No. 57 of the Cabinet of Ministers in October 26 1999, which accepted the option

of direct dismantling of SRR to “green field” with the start of decommissioning and dismantling procedures in 2001. Decommissioning of the SRR is presented in the report by Cross [3].

THE EXPERIENCE OF DECOMMISSIONING AND DISMANTLING

According to the concept of decommissioning, the preparatory measures should be performed from 1999 to 2002. Their costs were to be supported from the state budget and the Environmental Protection Foundation (EPF). In 1999, the first year of practical activities for decommissioning of the SRR and the first results could be discussed and plans were verified. According to the Order of the Ministry of Environmental Protection and Regional Development from 10 January 2001, the steering group was set up to co-ordinate the decommissioning of the SRR.

Organization of decommissioning of SRR

It was shown [4-6], that a suitable organization facilitates the decommissioning activities. According to the policy of the MEPRD, RAPA Ltd. deals with decommissioning and dismantling of the SRR. The steering group coordinates and the Radiation Safety Centre (RSC) controls all these activities. The principal schema of the decommissioning organization is shown in Figure 2.1 and it shows how all decommissioning activities are performed with necessary control and optimization of investments.

Execution of decommissioning activities of Salapils Nuclear Reactor

Execution of a sampling and analysis program was also performed to complete the radiological information about the SNR. All the territory and buildings were tested to check the possible radiation contamination. These data are treated and a data base for all buildings and reactor systems has been prepared now. All decommissioning activities were performed according to scheme in Fig. 2.2. The dismantling of the second cooling circuit, scientific equipment in the reactor’s building; collecting and treatment of “historical waste” (see Figures 3.3, 3.4). One of the first tasks was to clean the territory of the SRR from conventional waste: unused scientific equipment, metallic scrap and other waste from different laboratories.

Dismantled scientific equipment and material were controlled using a complex for free release. All material and scientific equipment from the reactor building passed the control using a large scale CCM radioactive waste monitor, a 200 l drum control unit or a 50 l radioactive waste monitor (gamma and beta radiation) (see Figure 3.5). Studvik -type concrete containers (see Figure 3.6) with an external size of 1.2 m x 1.2 m x 1.2 m were used for removing and conditioning the radioactive waste from interim radioactive waste storages, the reactor hall and scientific labs. In such a way, all radioactive waste outside the reactor building will be conditioned and disposed of by 2002.

The total amount of different dismantled material is presented in Table 1.

Table 1. Material flux from decommissioning of Salaspils Nuclear Reactor.

Year	1999	2000	2001	Total
Metallic scraps for reuse and recycling, (tons)	11	31	48	90
Concrete for disposal on site, (tons)	9	64	230	303
Other material for disposal, (tons)	3	38	9	50
Conditioned radioactive waste, (tons)	2	7	16	25

waste, (tons)				
Conditioned spend sealed sources and waste, (Bq)	6.2×10^{12}	4.6×10^{12}	1.8×10^{12}	12.6×10^{12}

The main amount of dismantled material (appr. 95%) was non-radioactive waste for reuse, recycling or disposal on site. Dismantling activities were performed by former staff of the Salaspils Nuclear Reactor using services of different companies, especially, for free released facilities and systems. Skilled former staff of the Salaspils Nuclear Reactor were dismantling radioactive facilities and collecting and conditioning the "historical" radioactive waste.

CONCLUSIONS

1. The concept for the decommissioning of the Salaspils Research Reactor has been prepared and accepted for the dismantling of the nuclear facility up to "green field" within the next 10 years.
2. A corresponding structure for the decommissioning of the Salaspils Nuclear Reactor has been established.
3. Necessary manuals and work plans for the decontamination of the outside and inside of the reactor building from radioactive waste were prepared.
4. Actual work has been carried out to decontaminate the territory and reactor building from radioactive waste.
5. The second cooling system and zero power reactor have by now been dismantled.

ACKNOWLEDGEMENTS

The authors want to make acknowledgments to International Atomic Energy Agency and personally Michele Laraia and Jan Stuller, and the Environmental Protection Foundation for their interest in and support of our projects .

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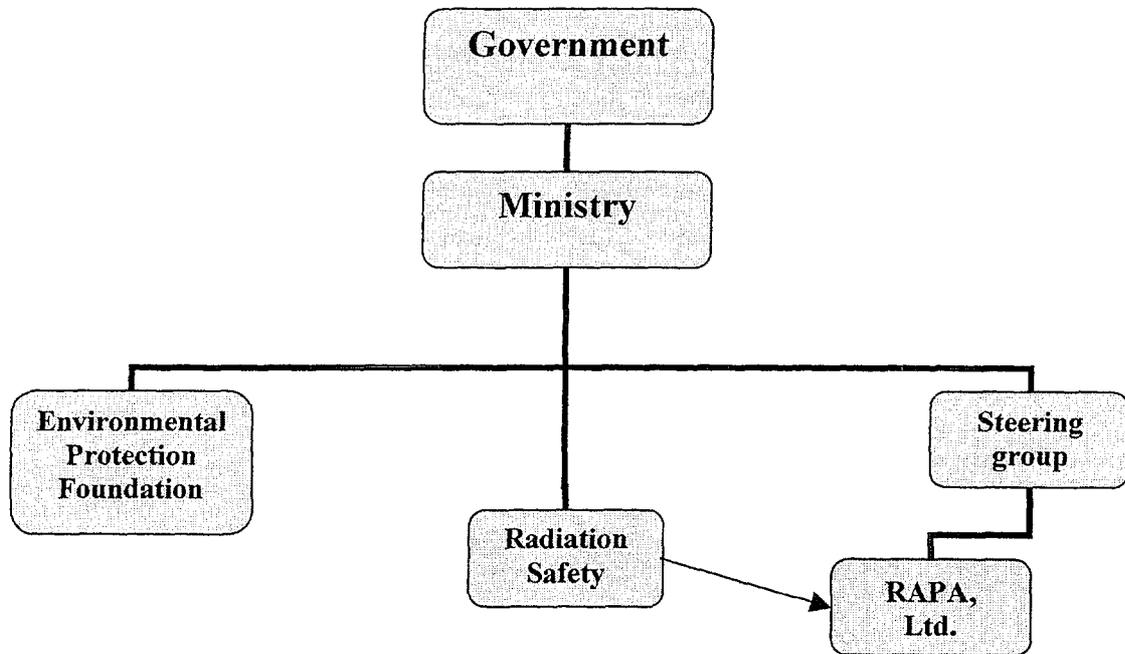


Fig. 1 Organizational chart for the SRR decommissioning

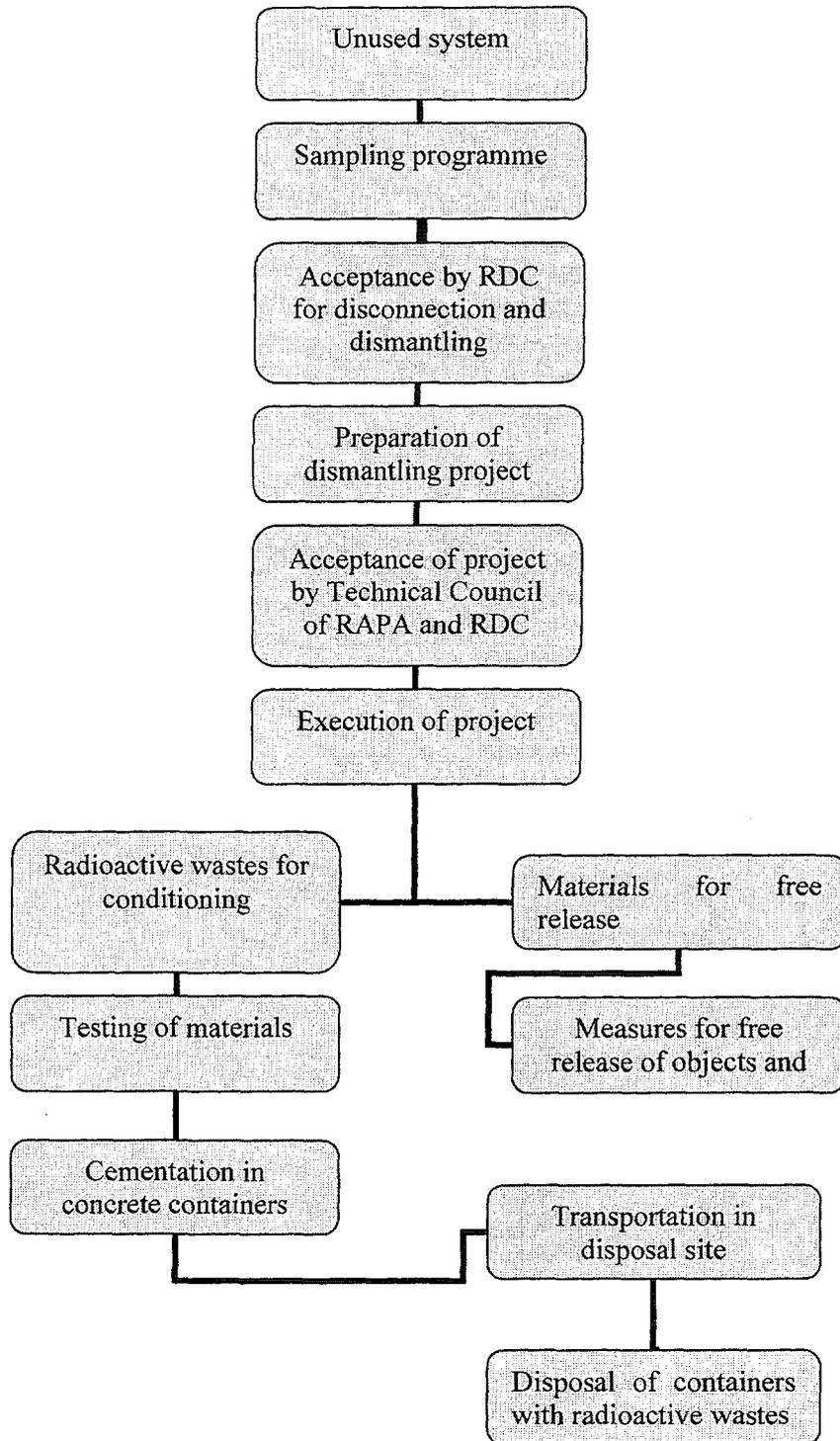


Fig. 2 Organizational scheme for the dismantling of unused facilities and reactor systems

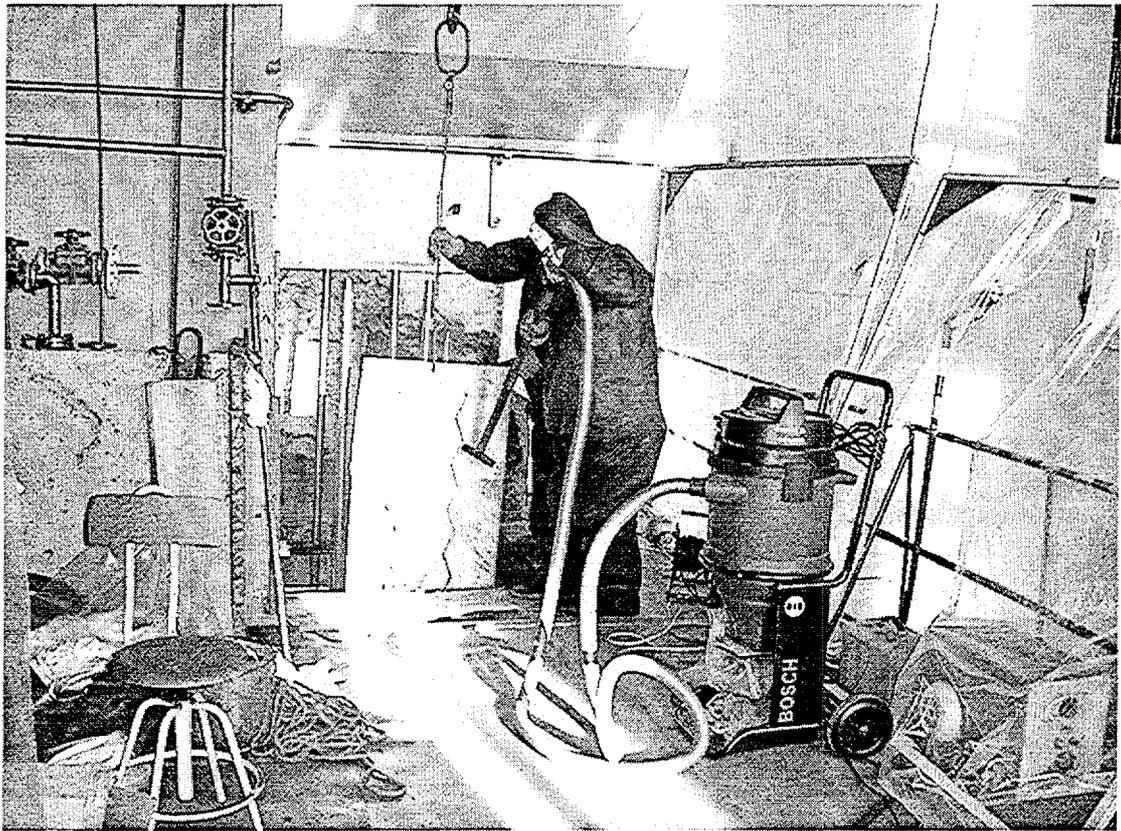


Fig. 3. Dismantling activities in the reactor hall.



Fig.4. Dismantling of the unused concrete tank in the SNR yard.

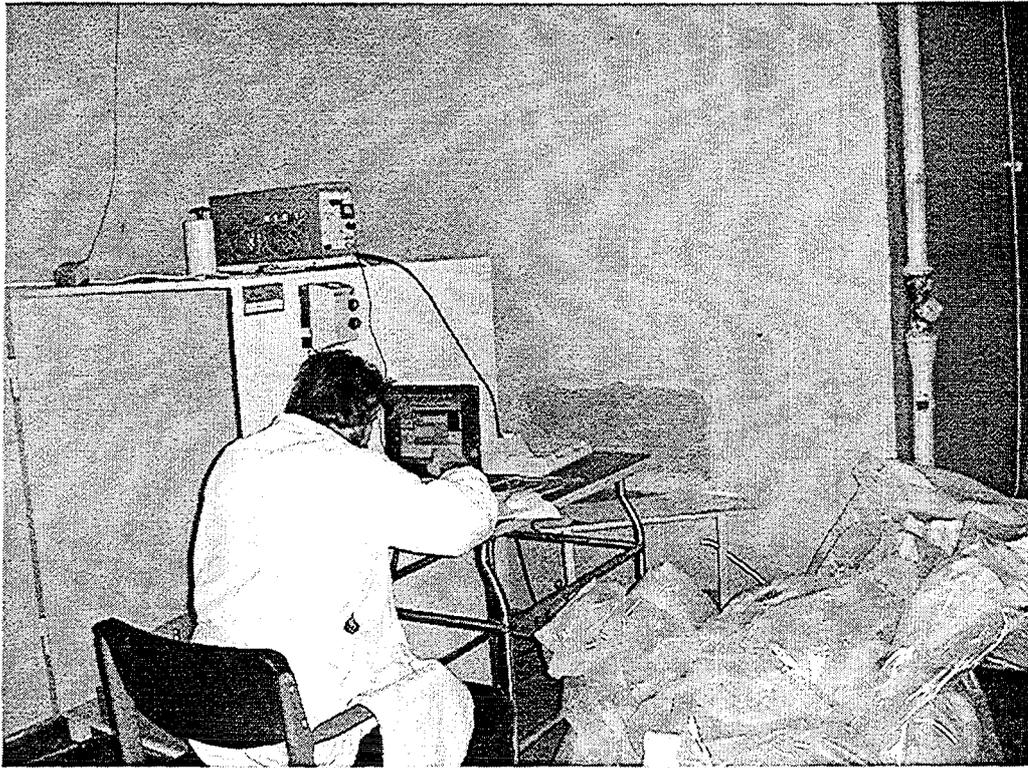


Fig. 5. Free-release measurements using a 200 l drum radioactive waste monitor

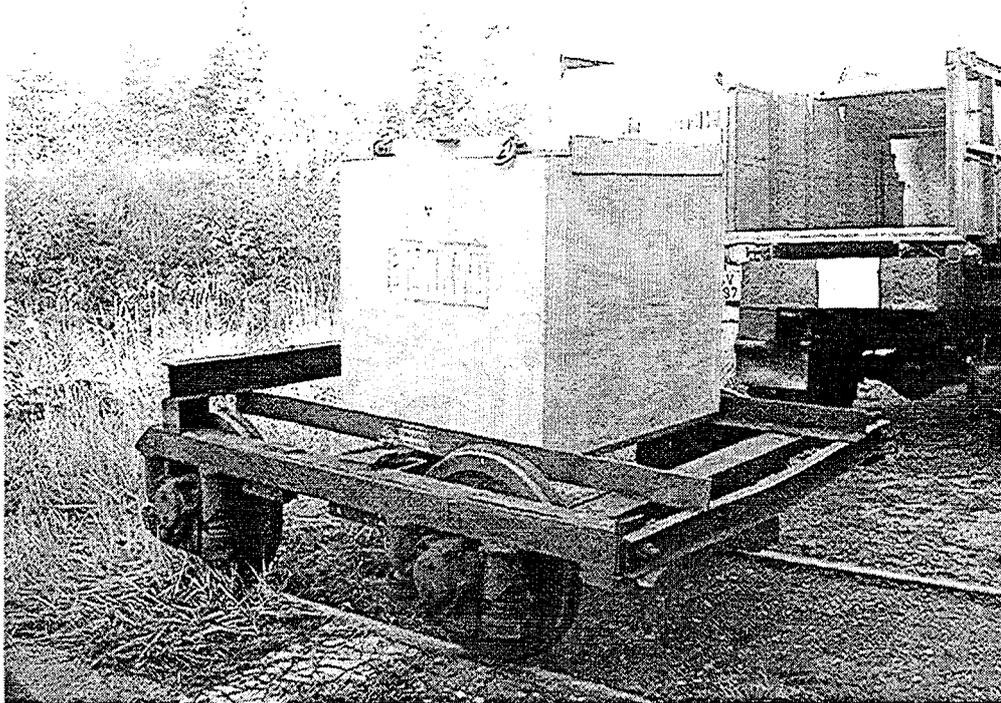


Fig. 6. Container with radioactive waste is prepared for transportation to the disposal site.