CURRENT STATUS OF THE BN-350 FAST REACTOR

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Abstract

In this paper described general situation with electricity production in Kazakstan and current status of the fast breeder reactor BN-350 for the period May 1996 - May 1997. Since the project lifetime of the reactor finished in 1993 the special annual procedure on continuing operation was established. All responsible organizations agreed that the reactor finally will be shutdown in 2003. Taking into account this decision the administration of the reactor already started the preparation on the decommissioning program. Such international organizations as the IAEA and European Commission are actively participating in this process.

1. INTRODUCTION

Production of the electricity in the Republic of Kazakstan for 1996 had decreased on 11 % in comparison with 1995. The reason is in common recession of production in the Republic. The production of the electricity on nuclear station BN-350 remained at a previous level of 0.18% of the total production. The loading factor for 1996 was 20 % as well as in 1995, whereas earlier it was never been below 70 %.

The reactor was educed to the capacity of 420 MW only on February 4, 1997 that is stipulated by long outage of the reactor for fulfilment of work under the program of safety upgrade and, partially, absence of the sufficient financial resources for duly payment for control roads and of delay with receipt of the annual sanction on operation.

2. MAIN WORKS CONDUCTED IN 1996

The program of works on reactor BN-350 safety upgrading was developed in 1988. For past period the program was discussed many times, supplemented and changed according to the experience received. The works such as investigation of the site seismicity, research of emergency situation, additional strengthening of the equipment and building designs, creation of additional safety systems, the replacement of the equipment have been completed.
The following works and events should be noted that took place last year:

- The protection system of the reactor vessel and jacket against increasing of pressure - hydro-seal - was constructed and entered into operation.
- Using of the calculation code, that substantiate the allowable power levels of the reactor BN-350 in conditions of absence of the seismic resistant system for emergency cooling of an active zone, the IPPE experts had conducted precursory calculations of the reactor's parameters in case of active zone cooling by natural circulation of the heat-carrier.
- During October 1996, 4 experiments on research of heat exchange and process of natural circulation of the heat-carrier of 1 and 2 circuits are conducted. In experiments results are obtained confirming an opportunity of long-duration of decay heat removal after drainage of the steam-generators for a level of capacity 520 MW. The experiment ¹ 4 proceeded more than 30 hours and allowable levels of temperatures 420 °C for cold part of the secondary circuit pipeline were not exceeded.

- The principle decision on the discontinuance of the reactor operation in 2003 has been accepted. Proceeding from it the process of the preparatory work and development of the particular decommissioning programs is beginning now. First of all these are the programs on the radioactive wastes and spent fuel management.
- Within the framework of works beginning on the realisation of the new NPP with the light water reactor project construction the special financial resources for the valuation of an opportunity BN-350 replacement to the other nuclear facilities has been founded.

3. INTERNATIONAL CO-OPERATION ON BN-350 SAFETY UPGRADING

The meeting of the representatives of MAEK, KAEA and the IAEA on a question of harmonisation of the technical assistance of the BN-350 safety upgrade was held in Vienna during 23-24 October 1996.
Being based on the recommendations of the meeting 4 projects for realisation within the framework of technical co-operation programme with the IAEA were prepared by MAEK and transferred to IAEA.
Within the framework of technical co-operation programme with the European Commission 2 projects for safety and decommissioning were prepared also.

During of the last autumn the experts of MAEK, the NNC RK, the KAEA and Argonne National Laboratory (USA) had analysed a situation and some possible projects on management of the BN-350 spent fuel were developed.
Taking into account the present status of the spent fuel assemblies cladding that had been damaged during operation the preparatory work on its stabilisation had been begun since January 1997.