

BN-350 AS A FIRSTLING OF ATOMIC POWER ENGINEERING IN RK

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*Republican State Enterprise MAEC RK***BN-350 – ПЕРВЕНЕЦ АТОМНОЙ ЭНЕРГЕТИКИ
РЕСПУБЛИКИ КАЗАХСТАН**

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The fast reactors are economically expedient only if they are used for two purposes: heat generation and plutonium build-up for the nuclear power engineering.

The plutonium build-up will allow using almost the whole natural uranium, which may provide the humankind with the energy sources for many years.

BN-350 reactor also had two purposes: steam generation and plutonium build-up. The steam generated from the reactor was used for power generation (up to 150MWt) and sea water desalination (up to 12000t/day).

The main achievements in the field of application of fast-reactor technologies are:

- build-up of the secondary fuel for the fast and thermal reactors;
- sodium technology testing;
- large experience gained during the operation time;
- investigation of structural materials under severe sodium flows.

The energetic start-up of BN-350 reactor was conducted in July 1973. Its design life is 20 years. After the lifetime had been over in July 1993, its further operation was subject to the annual decisions about prolongation of the lifetime by one calendar year. Since December 1998, the reactor is being shutdown according to the RK Government decree №456 of 22.04.99 on "BN-350 reactor decommissioning in Aktau-city of Mangistau region". Based on the above decree, there was the plan on "Primary measures on BN-350 reactor plant decommissioning in Aktau-city", made up and approved by the Ministry of Science and High Education and by the RK Ministry of Power, Industry and Trade. The main goal of this "Plan..." is conversion of the BN-350 reactor plant into the nuclear safe state and its preservation within 50 years.

The reasons for BN-350 decommissioning are as follows:

- lack of the economical expediency of plant operation;
- existence of problems on LRW processing and burial.
- the objective of weapon-grade plutonium accumulation is not urgent;
- reactor design lifetime exhaustion.

When decommissioning the BN-350 plant, a significant amount of expenses will be committed to the activity related to handling with different kinds of radioactive wastes and metal-liquid coolants of the first and second circuits, and to the fire, radiation and overall safety. Therefore, solution of the issues of handling with sodium, when it is removed from the circuits, processed, and when the circuits are washed off of sodium, is very important during the BN-350 reactor plant preservation.

According to AS-88 rules, the general activity related to RP decommissioning in compliance with the plan, may be started only after a complete discharge of the reactor core and removal of spent fuel from the RP building.

Specialists of BN-350 developed a program on the primary engineering measures on preservation of equipment and on maintenance of the reactor under nuclear and radiation safety conditions. Implementation of the measures is complicated first of all due to the lack of financing and of the adequate experience in decommissioning of such type of the reactor.

At present, the following two primary objectives are to be achieved:

- fuel discharging into the holding ponds;
- as soon as the fuel discharging is over, a sodium coolant of the first circuit and a part of a sodium coolant of the second circuit should be drained into the coolant storage tanks.

As soon as the coolant draining is over, it is expected to start the works on its utilization and on utilization of cold trap filters.

Since the shutdown reactor is still a hazardous source, it is necessary to take measures on its conversion into a safe state, or on its maintenance in a safe operating condition.

The reactor decommissioning conception specified by the RK Government decree provides for preservation of its unit for 50 years. As soon as the above period is over, an additional integrated survey of the unit should be carried out, and a decision on its further "destiny" (prolongation of the preservation, final burial at the site, or its abandonment) should be made.

The available repository of LRW is almost occupied, and the complex used for LRW processing does not exist. At present, the options of LRW processing and its treatment into a solid state for a safe long-term storage are being selected.

Selection of the options of handling with a metal-liquid coolant of the first and second circuits is currently being made.

The technology of production of industrial sources of ionizing radiation, which are greatly demanded at the western part of the RK, has been developed and introduced at BN-350.

Besides, the issue on installation of a sodium stand at one or two loops of the second circuit is being currently considered.

All this allows providing the job opportunities for high-skilled personnel of BN-350 for several years more.

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