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PECULIARITIES OF MODERN NUCLEAR POWER PLANT

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The purpose of the project is to research the construction, the nuclear power plant operation principles and modern safety systems as well as the peculiarities of the Belarusian Nuclear Power Plant which is under construction and the prospects of its development. Special attention is drawn to one of major functions in the safety system.

Nuclear power plants are thermal power stations which generate electrical energy from heat. They consist of numerous buildings and facilities the most important of which are as follows:

- the turbine building which houses several turbines;
- the containment building where the nuclear reactor is housed;
- the cooling tower.

In the reactor pressure vessel, the nuclear reaction and the associative release of thermal energy take place. Water is needed in order to absorb the thermal energy and keep the chain reaction going. Inside the vessel the water is heated to over 570° F. The resulting steam is eventually fed through a set of pipes to the turbine building. All of the turbines are connected by a spinning shaft to the electrical generator which in turn produces AC electricity.

The startup of the first power generating unit – the Belarusian Nuclear Power Plant – is planned for 2018. The second one is to be put in service in 2020. The design output power amount is 2400 megawatts. This is an advanced design of a PW-type reactor.

Nuclear power plants have multiple safety systems to ensure 3 basic functions: controlling the reactor, cooling the fuel, containing radiation. When the reactor is operating, the power level is controlled by adjusting rods and varying the water level in vertical cylinders. When needed, the reactor can safely and automatically shut down within seconds.

Nuclear reactors have two independent, fast-acting and equally effective shutdown systems. Both systems work without power or operator intervention. However, they can also be manually activated. These systems are regularly and safely tested.

In the research we have analyzed the following:

- 1) the operation principles of the basic nuclear power plants` elements;
- 2) prospects of nuclear power generation developments based on Belarusian Nuclear Power Plant;
- 3) modern safety systems at a nuclear power plant.