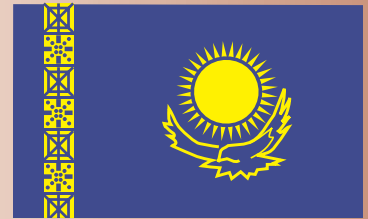


8.0 Kazakhstan

Kazakhstan operates one nuclear power reactor at its plant in Aktau. The Soviet-designed BN-350 is a sodium-cooled, fast-breeder reactor that began operating in 1972. It is the sole source of electricity and heat for the city of Aktau, which is on the banks of the Caspian Sea in sparsely populated western Kazakhstan. Kazakhstan intends to shut down the aging reactor in 2003 and construct new power reactors in eastern Kazakhstan.

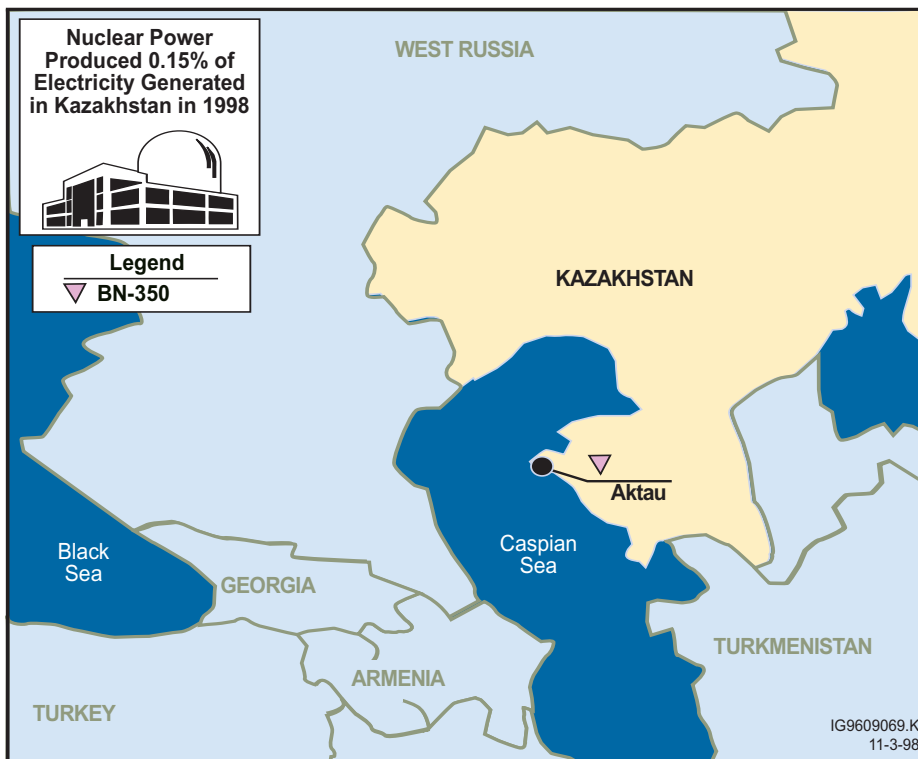
In November 1997, the United States agreed to conduct joint nuclear safety projects with Kazakhstan.

Historically, Russian organizations carried the primary responsibility for supporting safe operations and maintenance at Aktau. With the breakup of the Soviet Union, the plant lost key experienced staff. Kazakh personnel need to acquire capabilities for conducting safety analyses, transporting and storing spent fuel, and decommissioning the reactor.



Reactor Type in Kazakhstan

- ◆ One BN-350 reactor



The Nuclear Power Plant in Kazakhstan Participating in the Cooperative Effort to Improve Nuclear Safety

Key Accomplishments

8.0 Kazakhstan

- ◆ The United States and Kazakhstan have agreed to move Aktau's spent fuel to a safe, below-ground storage site in northeastern Kazakhstan.
- ◆ Kazakhstan has established a Nuclear Technology Safety Center to perform safety analyses of the country's nuclear facilities. U.S. specialists have completed a preliminary plan for supporting the Safety Center's development.
- ◆ Kazakh specialists participated in a training workshop on safety analysis preparation and review. U.S. experts presented the workshop.

8.1 Operational Safety and Spent-Fuel Storage

U.S. specialists will collaborate with Kazakhstan to improve the safety of the Aktau plant while it continues to operate. U.S. and Kazakh specialists will exchange information and conduct joint workshops on safe operations and maintenance, with topics specifically addressing the Aktau reactor.

U.S. and Kazakh specialists also will work to address the safety of the plant's dry-storage system for spent fuel. Under a U.S. and Kazakh agreement, Aktau's spent fuel will be moved to a safe, below-ground storage site in northeastern Kazakhstan. U.S. and Kazakh personnel are analyzing the safety of the equipment and procedures for packaging and transporting the spent fuel.

8.2 Safe Shutdown and Deactivation

U.S. specialists will work with Kazakhstan to develop safe shutdown strategies for the Aktau power reactor, including chemical deactivation of its sodium systems. U.S. specialists will provide training for Kazakh personnel and work with them to develop a technical plan for shutting down Aktau.

U.S. specialists also will provide information on U.S. experience in shutting down and deactivating two nuclear reactors, EBR-II at Argonne National Laboratory West in Idaho Falls, Idaho, and CP-5 at Argonne National Laboratory East near Chicago, Illinois. EBR-II, a sodium-cooled fast reactor, is similar in many respects to Aktau's reactor. CP-5 is the site of the first large-scale decontamination and decommissioning project funded by the U.S. Department of Energy. Specialists working on the project have demonstrated and evaluated 23 innovative technologies, some of which may be relevant to the decontamination and decommissioning of the Aktau reactor.

8.3 Nuclear Technology Safety Center

Kazakhstan established the Nuclear Technology Safety Center in 1998 to perform independent safety analyses of the country's nuclear facilities. Creation of the center is a milestone in Kazakhstan's effort to improve its nuclear safety infrastructure. The training and information exchange that will take place at the center will engender an improved safety culture in the Kazakh nuclear industry. The center's computer resources and expertise will create an increased capability for safe operation, maintenance, and regulation of nuclear facilities. These capabilities also will support safe design and construction of proposed facilities and the safe transport and storage of spent fuel.

In October 1998, U.S. specialists completed a preliminary plan for supporting the center's development. U.S. efforts will focus on training, information exchange, and the transfer of computer hardware and software essential for safety analyses. Also in October, Kazakh workers completed the remodeling of facilities to house the center. The United States will transfer U.S.-developed safety analysis codes for installation on the center's computer network.

U.S. experts are working with Kazakh specialists to develop in-country expertise in conducting nuclear safety analyses. Through a series of workshops, U.S. experts are training Kazakh specialists to use safety analysis codes and to develop quality assurance procedures for safety analyses. In November 1998, U.S. experts completed the first workshop in Kazakhstan, focusing on safety analysis preparation and review.

Kazakh personnel will participate in short-term training assignments at the U.S. and Russian safety centers and at Argonne National Laboratory West in Idaho Falls, Idaho, where they will observe activities involved in closing the EBR-II reactor. U.S. and Kazakh students will participate in educational exchanges.

With technical support from U.S. experts, Kazakh specialists will create an Internet site that provides access to nuclear safety data collected by the center. The website will be modeled after and have links to the websites established by the U.S. and Russian International Nuclear Safety Centers. (For details on those safety centers, see Section 6.5.2.)