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NNSA National Nuclear Security Administration

Elimination of Weapons Grade Plutonium Production (EWGPP)

The purpose of the EWGPP program is the permanent shutdown of the last three operating Russian nuclear reactors that produce weapons-grade plutonium. Plutonium production is a nonproliferation risk, as plutonium can be used in a nuclear weapon. The United States and the Russian Federation have agreed to halt their production of plutonium, and have been cooperating for the past decade to close their plutonium production facilities. In Russia, ten of these plutonium reactors have been shut down, while three remain in operation.

ADE-4, 5 Reactors at Seversk

ADE-2 Reactor at Zheleznogorsk

These three reactors are not only a nonproliferation threat, but they pose a significant nuclear safety risk. The design of the reactors predates that of the Chornobyl plant, and is one of the least safe designs in operation today.

These three reactors, however, provide necessary heat and electricity to two Siberian cities that are part of the Russian nuclear weapons complex: Seversk and Zheleznogorsk. The plutonium production facilities also provide employment for Russians living in these cities.

Under the EWGPP program, the United States is providing support to the Russian Federation for the construction of replacement fossil fuel energy plants in exchange for the permanent shutdown of the plutonium reactors. The Russian Federation has agreed to permanently shut down the reactors once

the replacement facilities are operating. Thus, the civilian energy requirements of the surrounding region will be met as the existing plutonium production reactors are replaced with a safe source of heat and electricity.

Former U.S. Secretary of Energy Spencer Abraham and Russian Minister of Atomic Energy Alexander Rumyantsev signed the Implementing Agreement for the project in March 2003. DOE contracted with U.S. firms to oversee the work, all of which will be carried out by Russian contractors and subcontractors.

A schedule and project milestones ensure that reactor shutdown is proceeding concurrently with the construction and refurbishment of the fossil fuel plants. The reactors at Seversk (designated ADE-4, 5), the Russian term for plutonium production reactor will be shut down by 2008, while the reactor at Zheleznogorsk (ADE-2) will be shut down by 2011.

The EWGPP program has three components:

Seversk Plutonium Production Elimination Project:
Refurbishment of the existing fossil fuel power plant and shutdown of the existing plutonium reactors.

Zheleznogorsk Plutonium Production Elimination Project:
Construction of a new fossil fuel power plant and shutdown of the existing plutonium reactor.

Reactor Shutdown Project: Measures to ensure that the Russian Federation is pursuing shutdown of the three remaining reactors at a rate comparable to U.S. construction and refurbishment of the fossil fuel plants at Seversk and Zheleznogorsk.

Seversk Plutonium Production Elimination Project

The objective of the Seversk project is the refurbishment of the existing fossil fuel plant and the shutdown of the two remaining plutonium production reactors in that city by 2008.

Seversk Fossil Fuel Plant

The existing fossil fuel plant at Seversk is being refurbished in order to enhance the efficiency and reliability of the existing fossil fuel facility. This work will bring the 1950's-era coal-fired heat and electricity plant up to modern standards, and the plant will provide 235 megawatts of electric power to the surrounding region. The facility will provide heat and electricity to the city of Seversk.

Plant refurbishment is proceeding concurrently with the planning, permitting and licensing required for reactor shutdown. A U.S. oversight contractor, Washington Group International, is working with the Russian construction company Rosatomstroi in carrying out the project at Seversk. The project cost, which includes both work done by Russian contractors and management costs for U.S. contractors, is approximately $387 million (U.S.$).

Site preparation began in December 2004 and construction began in April 2005. The first major components for the construction of the fossil fuel plant have arrived on site. Installation of the boilers, which produce steam to turn the turbines to produce electricity, is in progress. Contracts have been made for purchase of the seven boilers that are being replaced; in addition, two boilers are being refurbished and an additional new boiler will be installed. Contracts are also in place for the purchase

of one of a total of three turbine-generator sets that will be installed at the plant.

The fossil fuel plant at Seversk is being constructed to run on coal, but may be modified to use natural gas in the future. If such a modification occurs, it will be funded by Russian resources and does not affect the shutdown of the reactors.

Zheleznogorsk Plutonium Production Elimination Project

The objective of the Zheleznogorsk project is the construction of a fossil fuel plant that will result in the permanent shutdown of the oldest operating plutonium production reactor.

Existing Uncompleted Fossil Fuel Plant

The oversight work at Zheleznogorsk is being carried out through a contract with a U.S. firm, Raytheon Technical Services, and contracts with Russian contractors and subcontractors. The total estimated cost for the Zheleznogorsk Project, including work done by the Russians and management costs to U.S. contractors, is $570.5 million (U.S.$).

Most of the existing uncompleted fossil fuel plant will be demolished, as the majority of buildings and equipment do not meet modern construction standards. Construction of a new central electricity and district heating plant, located at a site approximately six miles outside of the city of Zheleznogorsk, will begin in the fall/winter of 2005.

How Do Coal-fired Fossil Fuel Plants Work?

In both coal- and gas-fired plants, the fuel source is burned to produce heat, which boils water and creates steam, which passes through a turbine to generate electricity. Coal is burned in a large furnace to produce heat. The heat is then used to evaporate water in boilers, which creates steam. As the steam expands, pressure within the boiler increases. The steam is then used to spin a turbine that generates electricity, which is sent to a power grid and distributed for use.

The new fossil fuel plant will supply 117 megawatts of electricity to the city of Zheleznogorsk, which has an approximate population of 100,000. In Russia, a central district heating and electricity plant typically supplies a city and the surrounding region with heat, electricity and hot water.

Reactor Shutdown Project

The objective of the Reactor Shutdown Project is to ensure that the Russian Federation is pursuing shutdown of the three remaining reactors at a rate comparable to U.S. construction and refurbishment of the fossil fuel plants at Seversk and Zheleznogorsk. Under EWGPP, reactor shutdown and decommissioning are the responsibility of the Russian Federation.

Illustration of Russian Plutonium Production Reactor

In order to monitor ongoing progress towards the shutdown of the three reactors, key shutdown activities have been linked to key milestones with the construction and operation of the new plants.

Rosatom, the Russian Federation Federal Agency for Atomic Energy (formerly Minatom), issued decrees identifying activities critical to reactor shutdown in January 2005 for the reactors at Seversk, and in March 2005 for the reactor at Zheleznogorsk.

The EWGPP Insignia

The U.S. and Russian flags symbolize a joint U.S.-Russian effort to eliminate the plutonium production facilities that for the duration of the Cold War produced the material used in the massive nuclear weapons arsenals of each. The dove, an international symbol of peace, is shown flying towards the symbol for atomic energy. This represents a new era of cooperation between the U.S. and Russia and a turn towards the peaceful uses of nuclear technology.

International Participation

The projected cost of the EWGPP projects at Seversk and Zheleznogorsk is approximately $1 billion (U.S.$). Shutting down these reactors represents a significant nonproliferation and nuclear safety achievement to which international funding is critical.

There are two means of international participation in the EWGPP program:

- Contributions for the construction of the Zheleznogorsk fossil fuel plant.
- Contributions to projects that fall outside the scope of the U.S.-Russian agreement.

INTERNATIONAL CONTRIBUTIONS (U.S.$)	
United Kingdom	$20.0 million
Canada	$7.4 million
Netherlands	$1.2 million

International Contributions to Zheleznogorsk Construction

In 2005, Congress provided DOE with the authority to receive international funds to apply to the Zheleznogorsk project. Several countries have made vital contributions to the construction at Zheleznogorsk thus far, including the United Kingdom, Canada and the Netherlands. This funding is key to the timely shutdown of the reactor and maintaining the construction schedule and total project cost. Funding will be sought from other countries as part of their G-8 Global Partnership commitments. Countries wishing to contribute will sign a Memorandum of Agreement with DOE/NNSA.

Funding for projects that address issues outside the scope of the Implementing Agrrement but related to the shutdown of the reactors, in particular worker retraining, economic diversification and environmental remediation from reactor operation, is essential to reducing the negative impacts of the reactor shutdown. Measures are being taken to ensure that the challenges raised by the shutdown of the reactors be met. For instance, in partnership with EWGPP and Rosatom, Switzerland facilitated an international conference in February 2005 to highlight projects that complement the reactor shutdown process, help protect and remediate the surrounding environment and reduce the impact on the local economies through the creation of new business enterprises and jobs. Eleven countries and two international organizations attended this event. Countries wishing to participate in these activities will need separate bi-lateral agreements with Rosatom.

The following agreements provide additional information on EWGPP (PDF Format)**:**

Plutonium Production Reactor Agreement (PPRA)
Amendment to the PPRA
Implementing Agreement for EWGPP

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