

## INSTITUTE OF POWER ENGINEERING PROBLEMS (IPEP)

**LOCATION:** Sosny, near Minsk

ADMINISTRATION:

**Director:** Aleksandr Mikhalevich

**Deputy Director:** Anatoliy P. Yakushev (Iakoushev)

ACTIVITIES:

IPEP is the leading nuclear research institute in Belarus. It was created in 1989 when the Institute for Nuclear Power Engineering of the Academy of Sciences was divided into three institutes:

- The Institute for Power Engineering Problems
- The Institute for Physical and Chemical Radiation Problems
- The Institute for Radiation-Ecological Problems

Together, the Institutes form the Sosny Scientific and Engineering Complex under the Belarusian Academy of Sciences.[1,2]

According to Belarusian nuclear scientists, the now-restructured Belarusian Institute of Nuclear Power Engineering (INPE) designed a mobile nuclear power reactor with a 700 kW capacity (according to Yermashkevich, 630 kW) and created a working model, called Pamir.[3,4] This reactor was designed for military purposes and for territories, such as the desert or tundra, where it is difficult to connect to an electricity grid. This mobile plant was designed to work in conditions from -50 degrees Celsius to +50 degrees Celsius without any water resources.[3] The Pamir reactor used uranium enriched to 45 percent U-235 for fuel, with nitrogen tetraoxide for the coolant. Tests were performed using critical assemblies and the model itself for at least 3500 hours starting in 1985.[3,4,5] Approximately 60 emergency shutdowns took place, some of which resulted in the release of nitrogen tetraoxide and radioactive particles.[4] The project was scrapped in 1986 by a decision of the Belarusian government. Reportedly, the INPE also worked on a project to develop a fast-breeder reactor. This project was almost completed in 1985. A site had been chosen and construction was about to begin when the project was scrapped.[3]

Sources:

[1] CISNP Discussions with Belarusian official, April 1995.

[2] "Research and Design Organizations Attached to the Department of Physical-Engineering Problems of Machine Building and Energetics," <http://ns1.hmti.ac.by/organizations/institutes/inoteh.html>.

[3] CISNP Discussions with Belarusian official, 22 March 1996.

[4] Vasiliy Yermashkevich, "Belarus nikogda i nikomu ne ugrozhala!" *Narodnaya volya*, [7 or 8] February 1998, p. 2.

[5] A. Mikhalevich, A.Iakoushev, A. Batalov, and Yuriy Sivakov; "Ensuring Physical Protection Of Nuclear Materials In Belarus," Report Done for CNS, June 1995.

IPEP has been given the lead role in developing a program for the construction of [nuclear power plants in Belarus](#).

**REACTORS:** One (decommissioned)

NAME: IRT-M

TYPE: Pool

[*World Nuclear Industry Handbook 1993*, Nuclear Engineering International, p. 127.]

POWER:

The reactor initially operated at 2 MW and was upgraded in 1972 to a capacity of 5 MW. However, it never operated at more than 4 MW.

[CISNP Discussions With Belarusian official, April 1995.]

**FUEL:** up to 4 kg of U-235, enriched to 90%

["Nuclear Safety: Concerns With Nuclear Facilities and Other Sources of Radiation in the Former Soviet Union," GAO/RCED-96-4, November 1995, p. 24.]

**OTHER FISSILE MATERIAL:** in the form of fuel rods, pellets and powder

90% enriched HEU: approximately 40 kg [1,2]

Plutonium-239: approximately 14-15g [1,2]

20-89% HEU: approximately 330 kg [1]

**OTHER NUCLEAR MATERIAL:** in diverse forms

LEU: approximately 94 kg [1,2]

Natural Uranium: approximately 620 kg [1]

Depleted Uranium (about 0.4% U-235): approximately 450 kg [1]

Sources:

[1] CISNP Discussions with IPEP officials and Belarusian nuclear scientists, June 1994 and April 1995.

[2] A. Mikhalevich, A.Yakushev, A. Batalov, and Yuriy Sivakov; "Ensuring Physical Protection Of Nuclear Materials In Belarus," Report Done for CNS, June 1995.

COMMENTS:

Built in 1957, the IRT reactor first went critical in 1962.[1] The reactor was shut down in 1988, and decommissioning is in progress.[2,3] According to an official at IPEP, as of 19 March 1996, decommissioning was nearly finished, with completion likely to be in June or July 1996. However, this time frame is contingent upon an additional \$300,000-400,000.[4]

Sources:

- [1] *World Nuclear Industry Handbook 1993*, Nuclear Engineering International, p. 127.  
 [2] William C. Potter, "Report On Meetings In Moscow, Kiev And Minsk," 8 July 1992, p. 11.  
 [3] CISNP Interview with Belarusian official, April 1995.  
 [4] CISNP Discussions with Belarusian official, 18-19 March 1996.

**CRITICAL ASSEMBLIES:** Two

**NAME:** Critical Assembly No. 1

**FUEL:** Uranium: 234kg enriched to 20%

**STATUS:** Non-operational

NAME: Critical Assembly No. 2

TYPE: thermal

**FUEL:** HEU: 15kg enriched to 90%

STATUS: Non-operational

COMMENTS:

Operations on these critical assemblies are at a halt due to lack of funding. Fuel from the critical assemblies is being moved to a more secure facility at Sosny. It has been proposed that the critical assemblies be used for training purposes.

[CISNP discussions with A. Mikhalevich, April 1995.]

MPC&A:

As the sole repository of civilian fissionable nuclear materials in Belarus, IPEP has been involved in the international programs to strengthen Materials Protection Control and Accounting (MPC&A) standards. In early October 1996, the US and Belarus announced the completion of [MPC&A](#) upgrades at the Sosny center.[1,2] It has been reported that an MPC&A system for liquid and solid wastes has been established at this facility.[3]

Much of the funding for the upgrading of MPC&A has been provided through the [Cooperative Threat Reduction \(CTR\)](#) program and other international programs.

Sources:

- [1] "U.S. and Belarus Jointly Protect Nuclear Materials," Press Release, Embassy of the Republic of Belarus to the United States of America, 10 October 1996.  
 [2] "DOE Secures Nuclear Material in Belarus and Uzbekistan, Reduces Risk of Nuclear Proliferation," US Department of Energy Press Release, 1 October 1996, <http://www.doe.gov>.  
 [3] CISNP Discussions With Belarusian official, 18-19 March 1996.

**SPENT FUEL AND RADIOACTIVE WASTE:**

The Spent Fuel Storage facility under the Institute of Atomic Energy in Minsk has fuel assemblies with up to 100kg of U-235 with initial enrichment in the range of 22-36% and an average burn-up of 30% U-235.[1] All irradiated material at Sosny is stored in the Iskra storage facility in a storage pond.[3] Low-level waste generated during the operation and decommissioning of the IRT-M reactor is stored in an underground storage facility near Sosny.[4] Spent fuel from the reactor was sent to Russia for reprocessing (either to Mayak or the Mining and Chemical Combine).[2,4] Fresh and spent fuel (roughly 110 fuel assemblies--see [2/7-8/98 entry below](#)) from the Pamir reactor development project is stored at IPEP.[4, 5] [Click here for more on spent fuel and radioactive waste.](#)

Sources:

- [1] William C. Potter, "Report On Meetings In Moscow, Kiev And Minsk," 8 July 1992, p. 11.  
 [2] CISNP Interview with Belarusian official, April 1995.  
 [3] A. Mikhalevich, A.Iakoushev, A. Batalov, and Yuriy Sivakov; "Ensuring Physical Protection Of Nuclear Materials In Belarus," Report Done for CNS, June 1995.  
 [4] "Belarus--Nuclear Fuel Cycle and Material Production," <http://etd.pnl.gov:2080/fac/belarus/nuclear.html>.  
 [5] Vasiliy Yermashkevich, "Belarus nikogda i nikomu ne ugrozhala!" *Narodnaya volya*, [7 or 8] February 1998, p. 2.

**IPEP DEVELOPMENTS:**

**10/28/99: LUKASHENKA PROPOSES CREATING MPC&A CENTER IN SOSNY**

According to a 28 October 1999 report by Radio 1 (Minsk), during a visit to Minsk by IAEA Deputy Director Jihui Qian, Belarusian President Alyaksandr Lukashenka proposed creating a center for nuclear material protection, control, and accounting at the Sosny Institute of Power and Engineering Problems. Lukashenka also reiterated his proposal (initially made three years ago) to establish a nuclear-weapon-free zone in Central and Eastern Europe.[1,2]

Sources:

- [1] "NEGA soobshchayet," *Nezavisimaya gazeta* online edition, <http://news.mosinfro.ru/news/nq/99/10/data/n24-56.htm>, No. 204, 30 October 1999.  
 [2] Radio 1 Network, 28 October 1999; in "Belarus: President, IAEA Official Discuss Cooperation," FBIS Document FTS19991029000261. {Entered 8/8/00 IPZ}

**2/10/98: GOVERNMENT DENIES POSSESSING WEAPONS-GRADE MATERIAL**

The Belarusian government has refuted a television report stating that the country currently possesses over two metric tons of weapons-grade material, making Belarus a "nuclear threshold" state like India or Pakistan.[1] On 8 February 1998, the news program "Rezonans" alleged that Belarus has a stockpile of over two metric tons of weapons-grade plutonium and highly enriched uranium.[2] Director of the Institute of

Energy Problems under the Belarusian National Academy of Sciences Alyaksandr Mikhalevich stated that Belarus has 15 grams of plutonium and 500 kg of enriched uranium at Sosny for research purposes only. (See the listing of [fissile materials](#) above.) The materials are not weapons-grade.[1] An unnamed source at the IPEP at Sosny stated that there are two metric tons of nuclear waste, plutonium, and uranium. He said that it is highly unlikely that any of the material could be used for military purposes since it would require enrichment, a process which needs a vast amount of technology and expenditure.[3] President Alyaksandr Lukashenka called the allegations that Belarus is independently capable of developing weapons "stupid." [4]

[1] "Belarus Denies having Weapons-Grade Uranium," Radio Free Europe/Radio Liberty Newslite, 10 February 1998.

[2] Alyaksandr Zimowski, BTK Television Network, 8 February 1998; in "Rezonans Program Host Comments on Nuclear Waste," FBIS-TAC-98-041, 10 February 1998.

[3] "Belarus Said To Be Unlikely To Put Nuke Waste To Military Use," Interfax, no. 4, 9 February 1998.

[4] "Belarus Denies Possessing Know-How To Produce Nuclear Weapons," Interfax, no. 1, 12 February 1998. {updated 2/26/98 djw}

### **2/7-8/98: FORMER SOSNY DEPUTY DIRECTOR CALLS FOR SENDING ASSEMBLIES BACK**

Vasiliy Yermashkevich, a former deputy director of the Institute of Nuclear Power Engineering, stated in an article about the Sosny Scientific and Engineering Complex that the facility is wasting billions of Belarusian rubles to store 110 fuel assemblies from a failed reactor development project. He called for the assemblies to be sent to Russia, where they were constructed, so that Sosny would not have to dedicate any more resources to storing the assemblies. Yermashkevich states the fuel assemblies were kept "to increase the institute's prestige" even though they could no longer be used.

[Vasiliy Yermashkevich, "Belarus nikogda i nikomu ne ugrozhala!" *Narodnaya volya*, [7 or 8] February 1998, p. 2.] {Entered 3/31/98 LBN}

### **2/3/98: LUKASHENKA WANTS TO REVIVE SOSNY RESEARCH**

Speaking at IPEP in Sosny, President Alyaksandr Lukashenka announced that he would like to expand on the institute's unique research potential. He explained that although there are only three other nuclear research institutions in the world like Sosny, the Belarusian government has not exploited its profit-making potential. Presently Sosny scientists are conducting nine government projects in areas such as power engineering, energy conservation, and radiation safety. According to Lukashenka, the Belarusian Security Council and the National Academy of Sciences will cooperate to increase the areas of research at the facility.[1] Increased business taxes, profits from alcohol distilling facilities fabricated and sold by the Sosny Institute, and Lukashenka's "own personal fund" will fund the Sosny projects and scientists.[2]

[1] Belapan Radio, 4 February 1998; in "Lukashenka Says People Will Decide on Nuclear Power Plant," FBIS-SOV-98-035.

[2] ORT Television Network, 3 February 1998; in "Lukashenka Visits Minsk Nuclear Energy Institute," FBIS-SOV-98-036, 5 February 1998. {updated 2/36/98 djw}

### **7/18/97: SOSNY NEUTRON GENERATOR OPERATIONAL**

Belapan reported that the Sosny Research and Technical Facility has put a highly power neutron generator into operation, a project that took eight years to complete at an estimated total cost of \$1 million. The neutron generator will be used for research in the areas of nuclear physics, neutron physics, radiation chemistry, and biology.

[Belapan, 18 July 1997; in "Powerful Neutron Emitter Begins Operation," FBIS-SOV-97-199.] {Entered 8/18/97 LBN}

## **SCIENTIFIC RESEARCH INSTITUTE OF NUCLEAR PROBLEMS**

LOCATION: Minsk

OPERATOR: Belarus State University

DIRECTOR: Vladimir G. Baryshevsky

[William C. Potter, "Report on Meetings in Moscow, Kiev, and Minsk," 7/8/92, p. 11.]