



Status of nuclear legacy facilities in the Republic of Kazakhstan

XII International Forum ATOMEXPO-2022

Gumar Ekipovich Sergazin

Deputy Chairman

of the Committee for Nuclear and Energy Supervision and Control of the

Ministry of Energy of the Republic of Kazakhstan,

*Member of the Commission of the CIS Member States on the Peaceful Uses of
Atomic Energy*

g.sergazin@energo.gov.kz

Sochi, November 21, 2022

Nuclear Legacy Facilities in the Republic of Kazakhstan



Ulba Metallurgical Plant

1949



Semipalatinsk Nuclear Test Site

1949



Nuclear Legacy Facilities



Research Reactor Facility IGR

1960



Research Reactor Facility BWR

1967



BN-350 Reactor Facility

1972



Research Reactor Facility IVG.1M

1975
(modernization in 1990)

Research Reactor Facilities



The program for the return of HEU-fuel of research reactor facilities of Russian origin to the Russian Federation



>90%
enrichment
of uranium fuel



<20%
enrichment
of uranium fuel



- Strengthening the program for non-proliferation weapons of mass destruction
- Liquidation of high enriched uranium reserves

Conversion

- 1) Research Reactor Facility BWR**
2016 - Reactor conversion is accomplished;
- 2) Research Reactor Facility IVG.1M**
2022 - LEU reactor startup is performed;
2023 - reactor conversion.
- 3) Research Reactor Facility IGR**
2010-2022 - conversion capability studies are being conducted

RW

- 1) Research Reactor Facility BWR**
Storing in own RW disposal facility
- 2) Research Reactor Facility IVG.1M**
long-term storage in the RW disposals of the NNC of the Republic of Kazakhstan
- 3) Research Reactor Facility IGR**
long-term storage in the RW disposals of the NNC of the Republic of Kazakhstan

SNF

- 1) Research Reactor Facility BWR**
2008-2017 - SNF exported to the Russian Federation;
- 2) Research Reactor Facility IVG.1M**
2022 - unloaded and placed for temporary storage;
2024 - completion of SNF overpacking.
- 3) Research Reactor Facility IGR**
1966 - unloaded and placed for storage.

Liquidation of high enriched uranium reserves

- Dilution of non-irradiated graphite HEU-fuel has been completed;
- A conceptual dry mixing procedure for the disposal of irradiated HEU-fuel has been presented;
- The approval of experts from the National Laboratory of Idaho (USA), Sellafield (UK) and the IAEA has been received.

Issues of concern

- RW production after SNF processing;
- 2028 RW return to the Republic of Kazakhstan according to the Agreement between the Republic of Kazakhstan and the Russian Federation;
- Absence of conditions for RW acceptance and storage.

BN-350 Reactor Facility



- BN-350 is the world's first experimental fast neutron reactor with a liquid metal coolant
- Reactor startup is performed as of **November 29, 1972**
- Shut down as of **March 16, 1998**
- The decision on decommissioning was made by the Decree of the Government of the Republic of Kazakhstan dated **April 22, 1999**.
- SNF was placed for long-term storage at the Baikal-1 site (the territory of Semipalatinsk Nuclear Test Site) **2010**.
- Sodium Processing Plant has been built **2017**.



Resolution of the Government of the Republic of Kazakhstan No. 851 dated November 14, 2019

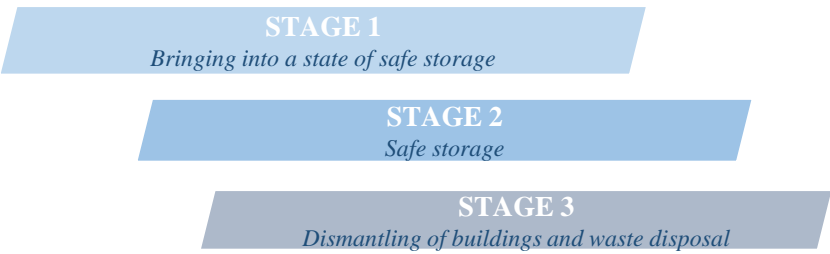


100% 



Ministry of Energy of the Republic of Kazakhstan

Reactor decommissioning concept (strategy)



It is necessary to recycle 610 m³ of radioactive sodium.



1986
m³ of liquid radioactive waste

7268
tons of solid radioactive waste

ISSUES OF CONCERN:

- Carrying out work on the handling of spent cold entrainment filters and extraction of the sodium-potassium alloy;
- Preparation of liquid metal sodium and its transportation system for processing at a sodium processing plant;
- Processing of radioactive sodium and LRW into safe storage

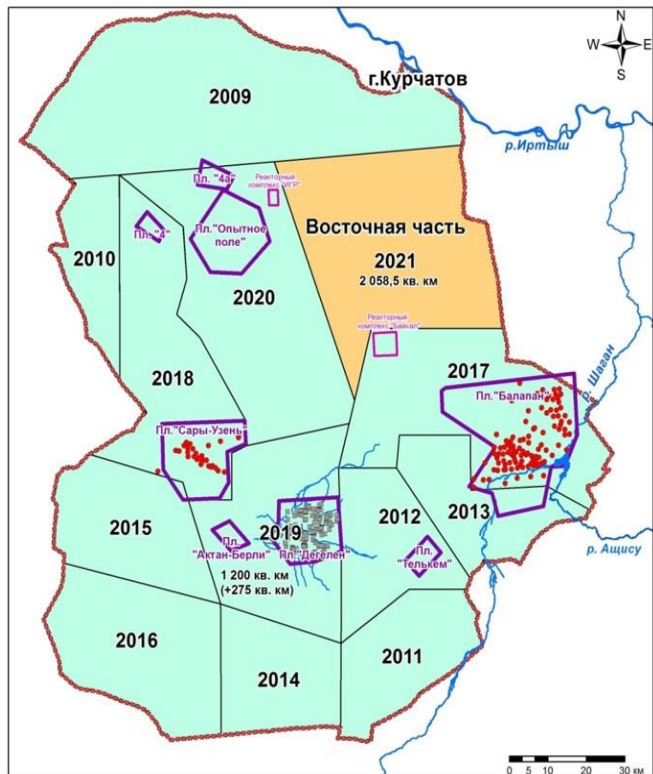
Current status

- ✓ A feasibility report of the decommissioning project has been developed;
- ✓ Joint work with Russian companies on the study of techniques for the treatment of LRW and the removal of sodium and sodium-potassium alloy from the cold entrainment filters has been completed;
- ⚙️ As of today, the Report is under consideration by the Ministry of Energy of the Republic of

Tasks

- 📄 A feasibility report of the decommissioning project has been approved;
- 📋 The choice of techniques and the study of the issue of financing;
- 📋 Approval of the Strategic Decommissioning Plan;
- 🌍 Processing of radioactive sodium, liquid and solid radioactive waste

Semipalatinsk Nuclear Test Site



Условные обозначения

- граница СИП
- границы испытательных площадок
- проведены комплексные исследования
- завершаются работы
- испытательная скважина
- испытательная штольня
- ручьи, реки

First tests:

August 29, 1949

Last tests:

October 19, 1989

*August 29, 1991 closed down by Decree No. 409 of the President of the Kazakh SSR
N.A. Nazarbayeva*

Liquidation:

- Degelen - 181 tunnels;
- Balapan - 13 wells

Comprehensive ecological survey (2008-2021):

More than 2 million of measurements

Analysis of about **100 thous. of soil samples**

Useful lands \approx **8,900 km²**

Excessively contaminated lands \approx **9,400 km²**



- A three-level system of physical protection has been created at all Semipalatinsk facilities

PROBLEMS

- Absence of a land user of contaminated lands;
- High degree of radiation contamination;
- The complexity of the transfer of test site land into economic circulation.

Semipalatinsk Nuclear Safety Zone

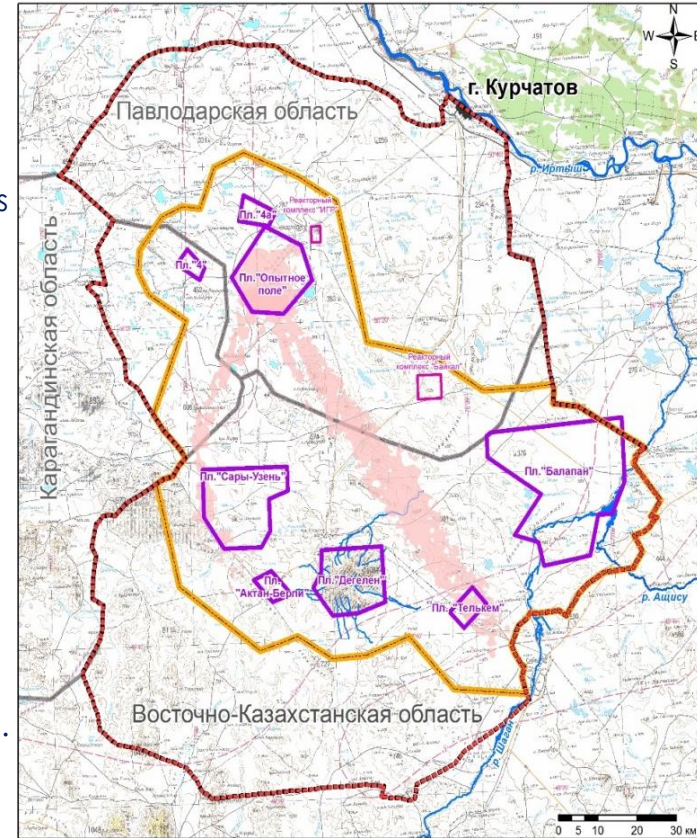
2 DRAFTS HAVE BEEN DEVELOPED TO SOLVE THE PROBLEMS:

- On the Semipalatinsk Nuclear Safety Zone;
- Accompanying draft

THE DRAFTS PROVIDE FOR:

- Differentiation of excessively contaminated and conditionally clean lands of the former Semipalatinsk Test Site;
- Creation of Semipalatinsk Nuclear Safety Zone on contaminated lands (~ 9,400 km²);
- Creation of conditions for the transfer of conditionally clean lands into stream of commerce (~ 8,900 km²);
- Definition of an authorized organization for the NWF effective management;
- Definition of a single land user of radiation-contaminated lands;
- Restriction of access to excessively contaminated sites;
- Rehabilitation of the lands of Semipalatinsk Nuclear Safety Zone;
- Continuous monitoring of the radiation situation;
- Performing a radioecological survey of the zones adjacent to the test site.

The exact boundaries and area of the Semipalatinsk Nuclear Safety Zone will be determined **based on the results of a comprehensive environmental survey and State Environmental Assessment** (2023)



Условные обозначения

- граница СИП
- границы испытательных площадок
- предполагаемая граница СЗЯБ
- изолиния следа радиоактивных выпадений

List of Nuclear Legacy Facilities

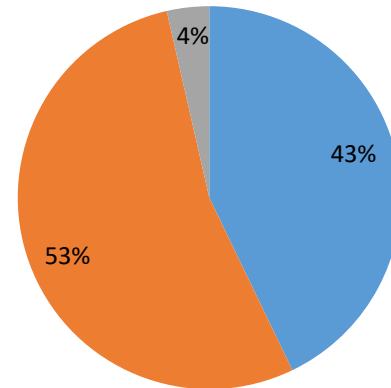


Koshkar-Ata Tailings Dump



Nuclear Legacy Facilities

■ Uranium mines ■ Uranium facilities ■ Tailings dump



Improvement of the RW management system

Uranium Mining Industry



Oil and Gas Industry



Metallurgical Industry



Nuclear and Power Facilities



Medical Industry



RW as a result of nuclear tests



Activity	Status of	
	Solid RW, tons	Liquid RW, m ³
Low level	58 million 744 thousand 984	1 million 987 thousand 536
Intermediate level	2 thousand 116	783
Total	58 million 747 thousand 099	1 million 988 thousand 319

A city skyline at sunset, featuring several prominent skyscrapers. The sky is filled with soft, golden clouds. The image is framed by a decorative border at the top, consisting of a blue band with intricate white floral patterns, and a larger white band with similar patterns below it. The text "THANK YOU FOR YOUR ATTENTION!" is centered in the middle of the image.

**THANK YOU FOR YOUR
ATTENTION!**