



Russian Research «Center Kurchatov-Institute»

**CONCEPTUAL ISSUES ON THE REGIONAL RADIOACTIVE
WASTE CONDITIONING AND LONG-TERM STORAGE CENTER
IN THE SAIDA BAY**

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Purpose

Reducing the radiological threat in the North-West Region.

Tasks:

Strengthening the regime of non-proliferation of radioactive waste.

Increasing the level of radiation safety in the region.

Solving the problem of decommissioning of nuclear submarines, nuclear service vessels and nuclear power installations of surface ships.

Ways:

Reducing the number of storage sites and areas for radioactive waste.

Reducing the volumes of radioactive waste by means of deep conditioning.

Organizing the safe long-term storage of radioactive waste.

List of weight and dimensional indexes of units stipulated for long-term storage

| | Name of a floating facility | Unit weight, t | Unit dimensions (LxBxH), m | Number of units | Name of a unit |
|---|--|----------------|----------------------------|-----------------|---|
| Units without spent nuclear fuel | | | | | |
| 1 | Nuclear submarines | 1600 | 14,2x12,5x12,3 | 150 | Reactor section |
| 2 | Floating technical facilities | 14740 | | 12 | Nuclear fuel storage section |
| 3 | Surface ships with nuclear power installations | 1800 | 17,0x6,5x8,0 | 3 | Unit with a steam generating installation |
| 4 | Nuclear ice-breakers | 2200 | 15,0x16,0x15,0 | 10 | Unit with a steam generating installation |
| | TOTAL | | | 175 | |

Volumes of solid radioactive waste (SRW) accumulated by 2007 and newly generated in the period of 2007-2020 in the North-West region of the Russian Federation

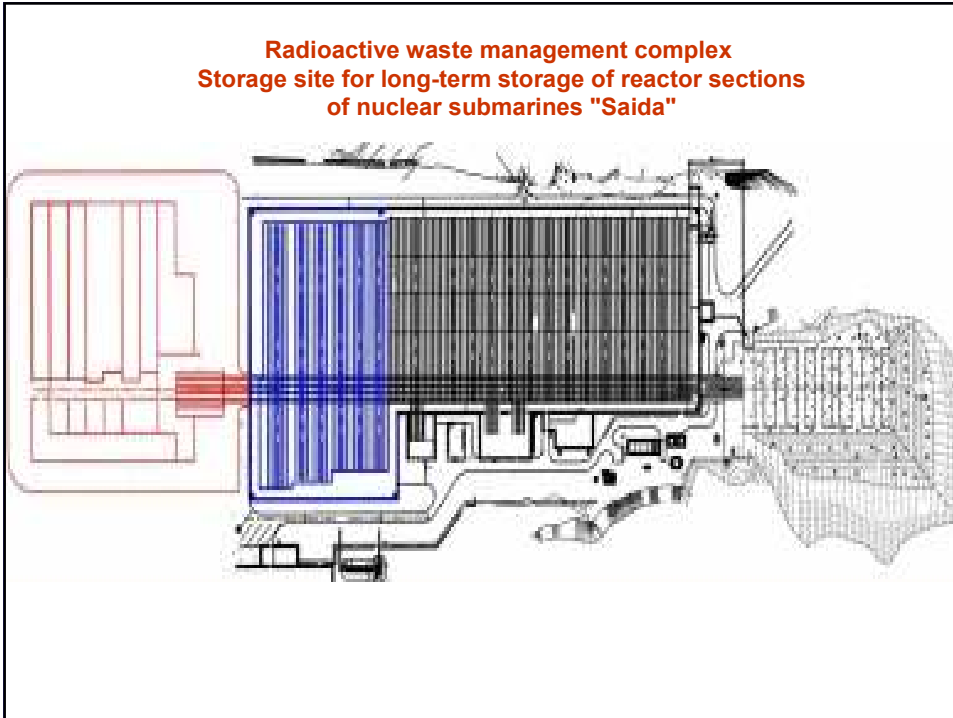
1. SRW which are subject to processing in order to ensure decommissioning of ships and rehabilitation of shore-based storages

| Site | SRW (m ³) accumulated | SRW (m ³) generated | SRW (m ³) total | Total activity (Bq) |
|---|-----------------------------------|---------------------------------|-----------------------------|--------------------------|
| Former shore-based technical facilities of the Russian Navy | 19150 | 13000 | 32150 | 5,1x10 ¹⁴ |
| Plants and factories | 2522 | 120 | 2642 | 5x10 ¹⁴ |
| Nuclear service vessels, floating vessels | 860 | 2640 | 3500 | 5x10 ¹² |
| Surface ships with nuclear power installations and ice-breakers | - | 555 | 555 | до 6x10 ¹² |
| TOTAL: | 25444 | 16728 | 42172 | 1x10¹⁵ |

2. SRW which are subject to processing after reducing the activity of nuclear submarine and surface ship and vessel units after their long-term storage .

| Site | SRW (m ³) accumulated | SRW (m ³) generated | SRW (m ³) total | Total activity (Bq) |
|---|-----------------------------------|---------------------------------|--------------------------------|---------------------|
| Reactor units of nuclear submarines and surface ships, storage units of nuclear service vessels | 20200 | 31545 | 51745 | 3x10 ¹⁶ |
| TOTAL: | | ~94000 m³ | ~3,1x10¹⁶ Bq | |

**Radioactive waste management complex
Storage site for long-term storage of reactor sections
of nuclear submarines "Saida"**



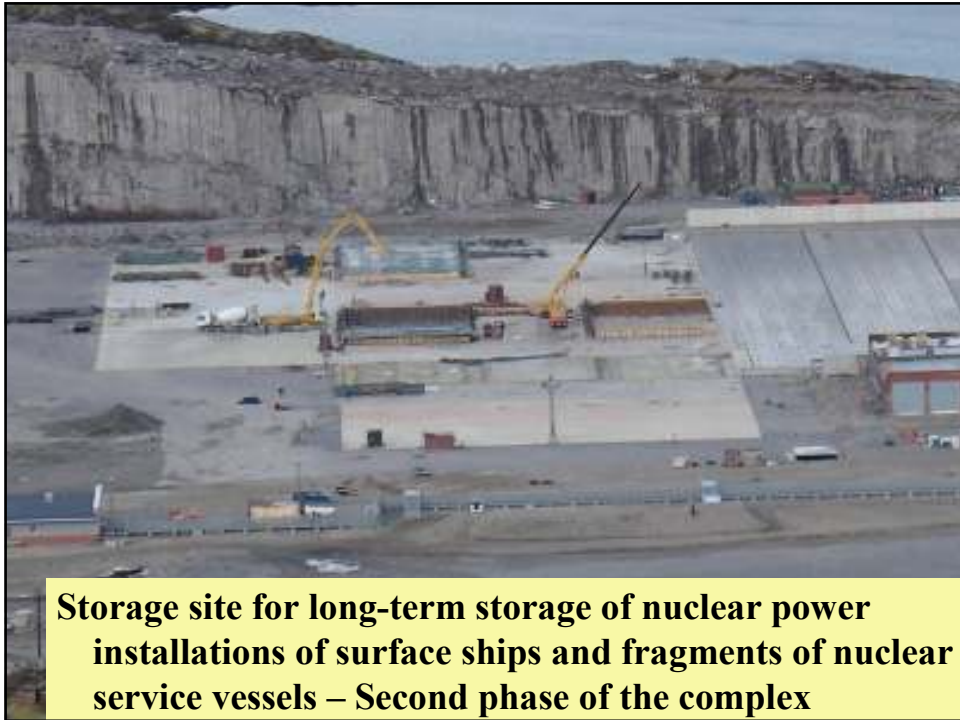
**Storage site for long-term storage of reactor sections of
nuclear submarines – First phase of the complex**

Hydrotechnical complex



Hydrotechnical complex with the transport system for heavy cargoes - Third phase of the complex





Storage site for long-term storage of nuclear power installations of surface ships and fragments of nuclear service vessels – Second phase of the complex



Survey works on the site of ZUS (Decommissioning Center “Saida”)



General view of the radioactive waste management complex

Regional radioactive waste conditioning and long-term storage center (ZUS)



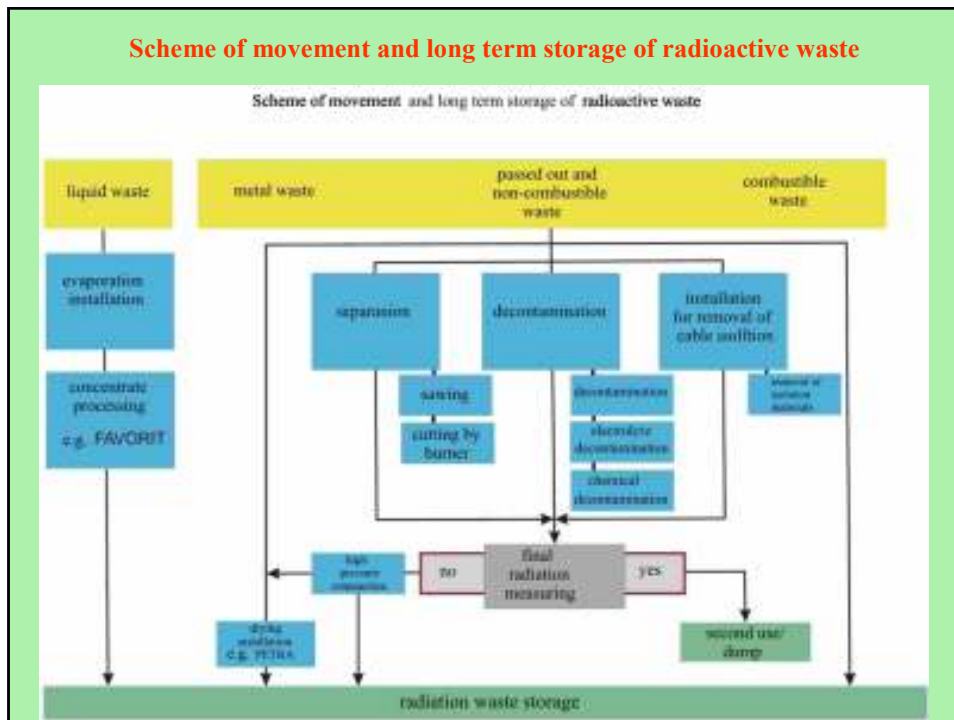
Structure of ZUS:

1. Dismantling shop for large-sized objects of storage
2. Technological block consisting of 5 caissons and a final radiation measuring facility
3. Sectional storage facility for separate storage of radioactive materials of different types
4. Block with power installations and filter-ventilation units
5. Transport corridor with rail tracks, floor tracks and airlocks
6. Manufacturing and laboratory block
7. Block for handling containers
8. Block of perspective development of the Center

Supporting systems of ZUS:

Environmental radiation monitoring system
 Radioactive materials record keeping and monitoring system
 Protection equipment complex
 Life-support systems

Scheme of movement and long term storage of radioactive waste



Conclusion

1. ZUS (Decommissioning Center “Saida”) is being created with technical and financial support from the FRG.
2. ZUS is the main element of the system of radioactive waste management in the North-West Region of Russia.
3. The creation of ZUS expands the scope of decommissioning of radioactive waste.
4. ZUS ensures the centralized, controlled, safe long-term storage of radioactive waste.
5. In the long view (before resolving the question of final isolation of radioactive waste), ZUS can be reorganized into the site of controlled storage of radioactive waste.
6. Creation of ZUS requires an integrated approach to resolving the question of primary processing of radioactive waste at points of shipment, as well as optimization of the decisions on the technical equipment of these points.