Italian – Russian Cooperation Agreement for Global Partnership

Liquiditating the Nuclear Heritage

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Background

- **The nuclear arsenal built during the Cold war period and subsequent decades was drastically reduced after the collapse of the Soviet Union.**
- **Financial difficulties experienced by the Russian Federation during the 90' slowed down the effort to dismantle de-commissioned nuclear submarines and nuclear installations.**
- **The international community agreed to share the burden to liquidate the heritage of the Cold war, through the subscription of several international agreements.**
- **The most significant, from a financial point of view, is the "Global partnership" launched in Kananaskis, Canada , by the G8 countries in 2003**

COOPERATION AGREEMENT for GLOBAL PARTNERSHIP

The Italian-Russian **Cooperation Agreement** for the **Global Partnership** envisages the allocation of **360 Meuro in 10 years** granted by the Italian Government.

The competent Organizations for the implementation of the Agreement are the **Ministry of Economic Development** (MiSE) for Italy and **Rosatom** for the Russian Federation.

A **Steering Committee** (2 Italian members + 2 Russian members) provides directives, approves the projects and controls the overall development of the activities.

An integrated **Project Management Unit** (called **UGP/ГУП**), based in Moscow and formed of 10 engineers ***(5 Italian + 5 Russian),*** carries out contractual activities, prepares the technical specifications and monitors the implementation of the projects.

Lines of activity and Management

Several lines of activities have been approved by the Steering Committee. The most significant ones are:

1. DISMANTLING OF NPSs AND TRANSPORTATION OF REACTOR COMPARTMENTS
2. IMPROVEMENT OF THE PHYSICAL PROTECTION
3. MANAGEMENT OF THE RADIOACTIVE WASTE
4. MANUFACTURING OF CONTAINERS FOR RW AND SNF
5. MANUFACTURING OF A INF-3 CLASS SHIP FOR SNF AND RW TRANSPORTATION

In 6 years of activities, **34 contracts** have been signed for a total value of more than **147 Meuro**. About **150 invoices** have been paid to the amount of **135 Meuro**; **180 internal reports and technical specifications** have been issued.

Activities and funds

Line of activities – Funds (Meuro)	**COMMITTED**	**SPENT**
1 – Submarine dismantling and unit transfer (including equipment delivery)	31	30
2 - Phisical protection improvements (design, equipment delivery, installation)	1	1
3 - Retrieval, conditioning and storage of radwaste (design, equipment, construction)	22	15
4 – Containers for alpha fuel (design, mock-up, tests, fabrication)	2	1
5 - Design and construction of a transport ship	76	76
Other projects and management	15	12
TOTAL	147	135

INF-3 class ship for SNF and RW transportation

A **76 Meuro** contract for the detailed design and construction of a ship for SNF and RW transportation has been signed in July 2008. The ship has been designed and manufactured by FINCANTIERI (Italy). She has been launched on December 16, 2010, delivered to Atomflot in July, 2011, and **transferred to Murmansk in August, 2011**.

DISPLACEMENT	3.000 tons
DOUBLE HULL	YES
LENGTH	77 m
WIDTH	14 m
HEIGHT	17 m
SPEED	12 knots
RANGE	3000 km
PROPULSION	2 X 1300 KW SEGREGATED DIESEL MOTORS EACH DRIVING ONE SHAFT LINE AND ONE PITCH PROPELLER
PAYLOAD	640 tons

INF-3 class ship for SNF and RW transportation

Construction, September 2010

INF-3 class ship for SNF and RW transportation

Launching, December 16, 2010

INF-3 class ship for SNF and RW transportation

Murmansk, August 2011

- The ship will be used to transport casks with **irradiated fuel** from various locations of Kola peninsula (Andreeva Bay for VVER fuel and Gremikha for alpha/VVER fuel) to the port of Atomflot, near Murmansk, for further transfer to Mayak

- Moreover it is expected that the ship will transport containers with **conditioned radioactive waste** from different sites of North-West Russia to the site of Sayda Bay for their final storage

INF-3 class ship for SNF and RW transportation

Arrival in Murmansk on 15th August, 2011

NPSs Dismantling

Five NPSs have been dismantled - **one Yankee Notch, two Victor, two Echo II**.

The Contracts have been signed with Nerpa shipyard in July 2006, March 2007, April 2008, June 2009, December 2010, respectively.

The Spent Nuclear Fuel (SNF) has been sent to Mayak and the Reactor Compartments have been transferred to Sayda Bay (NPS 542 in progress).

All activities have been carried out without significant problems or delays.

NPS	DISPLACEMENT (t)	YEAR OF DISMANTLEMENT
YANKEE NOTCH No. 415 PROJECT 667AT	8.800	2006 - 2007
VICTOR No. 601 PROJECT 671	3.650	2007 - 2008
VICTOR No. 604 PROJECT 671	3.650	2008 - 2009
ECHO No. 535 PROJECT 675	4.700	2009 - 2010
ECHO No. 542 PROJECT 675	4.700	2011

Dismantling of NPS Yankee Notch No. 415

Preparation to defueling, September 2006

Dismantling,
December 2006

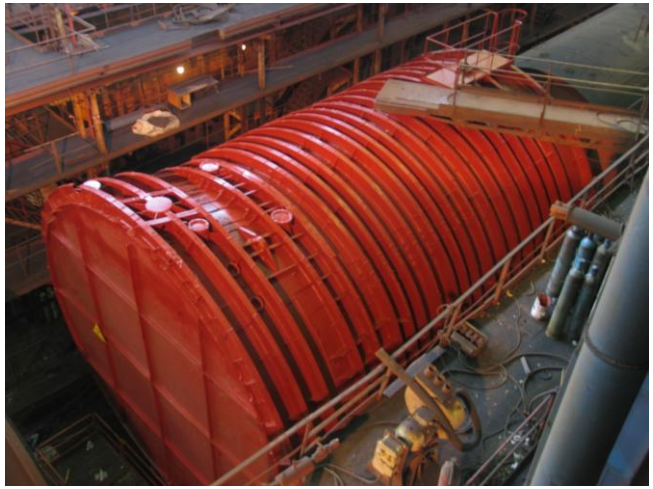
3RC in Sayda Bay, July 2007

Dismantling of NPSs Victor No. 601 and 604

NPSs 601 and 604 waiting for dismantling, March 2007

Dry docking of NPS 601, October 2007

Dry docking of NPS 604, August 2008



1RC of NPS 601 in Nerpa shipyard, March 2008

Dismantling of NPSs Echo II No. 535 and 542

535 waiting for dismantling, May 2008

Dry docking of 535, October 2009

1RC of NPS 535 in Sayda Bay, July 2010

Transportation of NPSs Spent Nuclear Fuel

From PM-12 to Imandra

Loading the cask (Lotta)

Loading the special train

The train ready to leave, December 2009

Equipment for NPSs Dismantling

Platform

Delivery of the equipment for the improvement of Nerpa and Zvyozdochka Shipyards industrial safety.

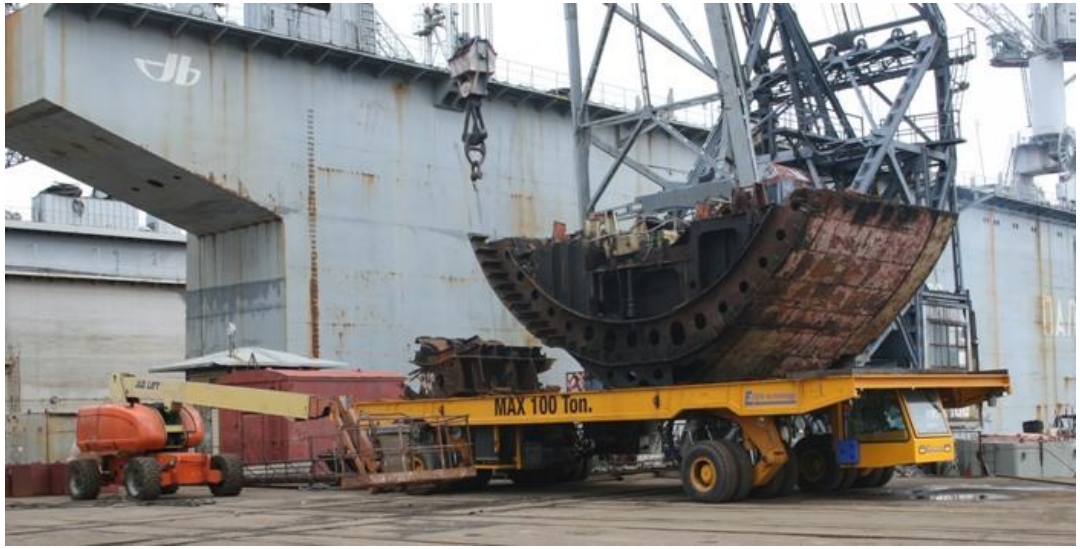
Contracts (**3.5 Meuro**) provide for the supply of special equipment coming from different European countries. In particular:

- welding, cutting, cleaning and painting equipment,
- forklifts, trailer trucks, compressors, special scaffoldings, individual protection means (400 masks)

All the equipment has been delivered and are being used.

Even if significant problems have been encountered during the custom clearance process, nevertheless the project targets have been fully implemented.

Tracker



100 tons trolley

Pontoon for transferring 1RC and 3RC units

40 NPSs out of 118 NPSs - initially in the North-West Region of Russia - have been reduced to one compartment units. They are located at Sayda Bay storage site. The remaining NPSs (78) have been reduced to **three compartments units, now floating at Zvyozdochka, Poliarny, Nerpa, and Sayda**.

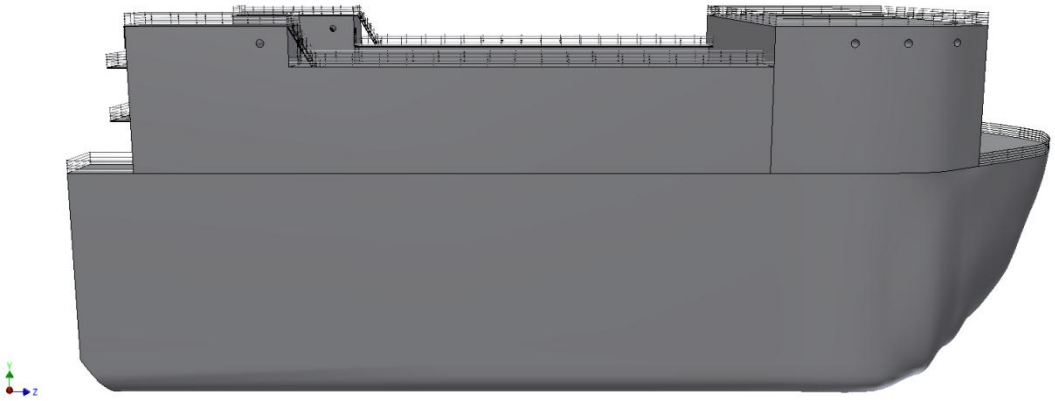
The **Pontoon** will be used to transport to Sayda Bay the Reactor Compartment units presently located elsewhere and to allow the dry docking of the floating units.

The **design** of the Pontoon is presently underway.

Complition of the design activities: summer 2012.

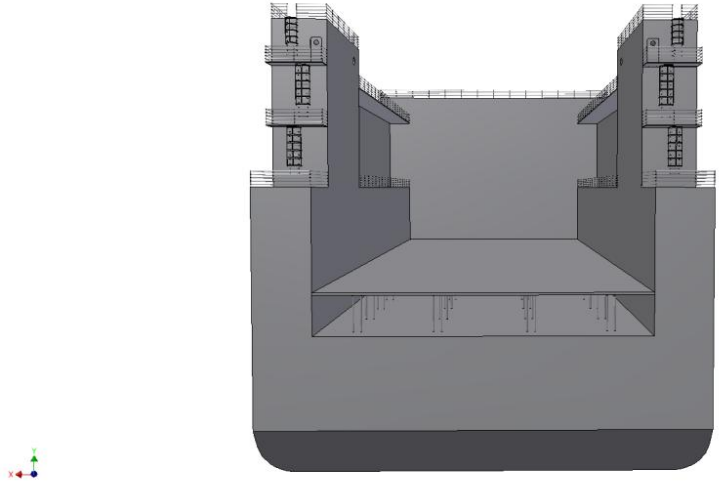
Main Characteristics:

Characteristic	Unit	Value
Max length	м	82,0
Width	м	27,6
Payload capacity	t	3100



Maximal limits for loads to be transported on board (NPS units or compartments of ATO ships):

Max length – 43,0 м;
Max width – 19,0 м;
Max height – 15,0 м;
Mass – 2955 t;
Max draft (for floating units)



Physical Protection

The projects are related to physical protection modernization at Nerpa and Zvyozdochka shipyards, aiming at:

- The replacement of obsolete physical protection systems,
- The installation of control systems for personnel and vehicle access;
- The supply of new systems for the physical protection of the water area.

Following the completion of the detailed designs of the physical protection systems, **the tendering procedure is underway** (Zvyozdochka) for the supply of the equipment. Contracts to be awarded in summer 2012.

IVECO Patrol trucks

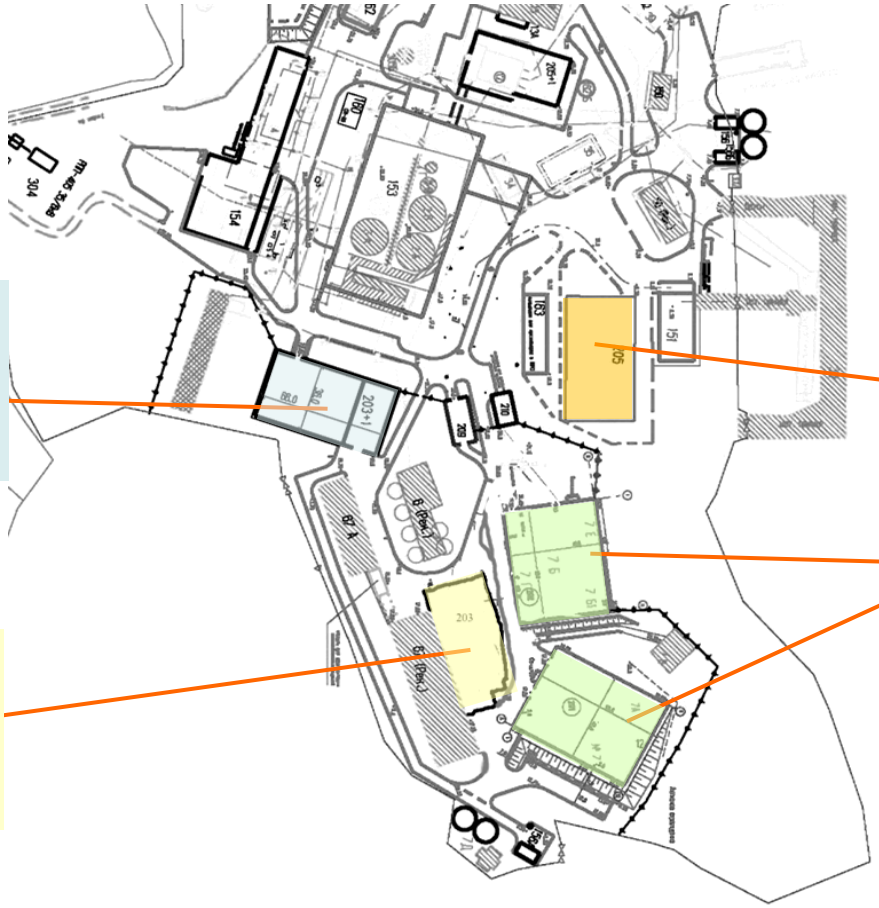
The **Strategic Master Plan** provided the guidelines for RW management in North-West Russia:

- Radioactive waste will be transferred to the Regional Center in Sayda Bay for long-term storage.
- LRW and SRW are to be conditioned and placed into containers, according to the requirements for long-term storage and final disposal, using existing or new infrastructures.
- Liquid and solid LLW and ILW will be processed on site.

When applied to **Andreeva Bay**, these criteria determine the need to build two treatment and conditioning facilities, for SRW and LRW, respectively, plus a temporary storage pad for conditioned waste before transferring to Sayda Bay.

Radioactive Waste Management

The management of radioactive waste at Andreeva Bay site is the most important project underway in terms of complexity and use of resources.



Radioactive Waste Management – Buildings 201 and 202

June, 2011

Following additional radiological surveys (2007 – 2009), the design of the **buildings 201 and 202** of the RW management complex in Andreeva Bay has been completed by VNIPIET at the end of 2009. Dimensions (m) are 48 x 66 (60) x 12.

Licensing of the design of the buildings has been released by GlavGosExpertiza in May, 2010.

The construction has been awarded to the Russian company RosSpezMontazh. The contract has been signed in August, 2010.

The construction of the buildings to be completed by July 2012.

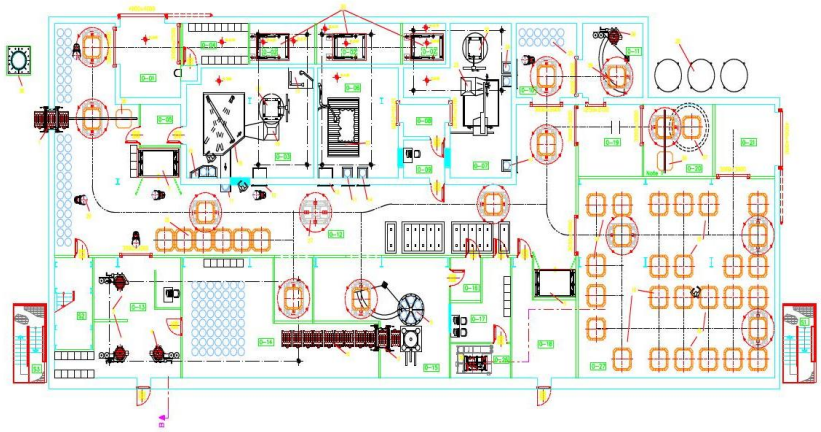
Radioactive Waste Management – Buildings 201 and 202

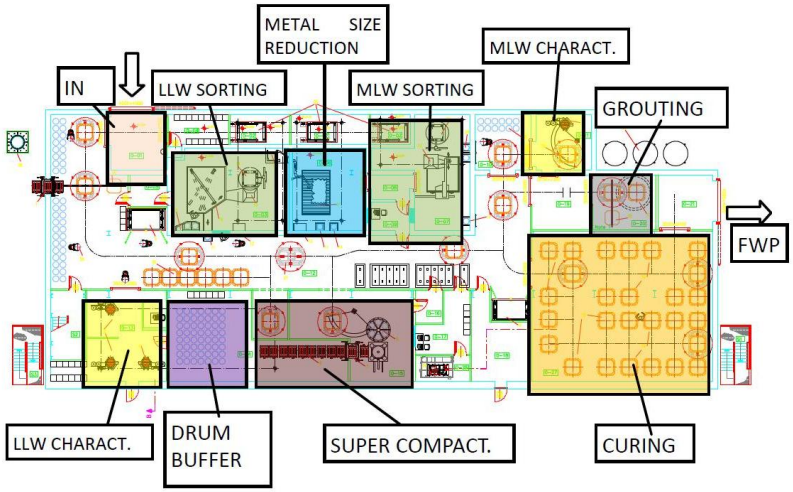
March 2012

Overview of the site May 2012

Andreeva Bay – Facilities for Liquid and Solid Waste Treatment

After the completion of a conceptual study (2007 - 2008), and following additional radiological surveys of the areas (2010), the construction of three facilities (solid and liquid treatment ones and the storage pad for conditioned waste) has been decided. The contract for the Design of the facilities (2010-2012) has been assigned to Ansaldo Nucleare / AtomStroyExport. Activities are in progress.





Simplification and Acceleration Strategy (1/2)

Simplification

At the beginning of 2011, ROSATOM has decided to anticipate the definitive closure of Andreeva Bay site to **2025 – 2030** (initially 2050). This decision has significantly affected the project of the LRW and SRW facilities and the storage pad. The **simplified project** will comply with the new requirements:

- replacement of reinforced concrete structures of the facilities with **metal structures and pre-fabricated panels**;
- **modular approach** for process systems;
- replacement the temporary storage facility (initial choice) with an **accumulation pad** protected by a simple and light structure.

Simplification and Acceleration Strategy (2/2)

Acceleration

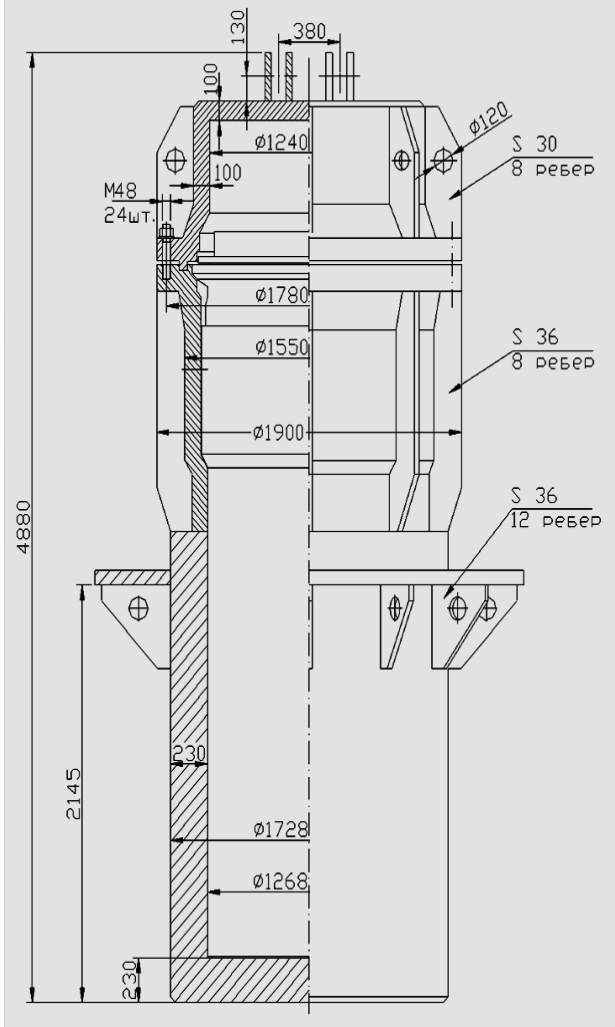
At the same time, an **acceleration** of the project will be put into effects: as soon as the design of the civil structures and the main technical characteristics of the components are finalized, the realization phase will start soon after. It will be probably subdivided into two separate contracts:

- construction of the buildings and purchase of the main components (e.g. super compactor, diesel generators, main tanks, pumps, motors, breakers, etc) and
- purchase of all other components and materials, assembling, training, tests and operation.

Contract for the preliminary construction activities to be signed in June 2012.

Facility operation to start in 2015, two years before the previous schedule.

Containers for Alpha Cores Transportation



CONTAINERS FOR TRANSPORTATION OF ALFA FUEL OF LIQUID-METAL COOLANT REACTORS PRESENTLY AT GREMIKHA

The detailed design of these containers has been already completed by the Russian Institute VNIITF and **negotiations are under way to assign the fabrication contract (10 containers)**.

In order to meet the Safety Authorities requirements,

- tests on a full scale mock up of the upper flange (Leak Tightness Test Stand) and
- tests for material and welding qualifications

Are being carried out.

Conclusions

DONE

INF-3 Ship "ROSSITA"

5 NPS Dismantled

Buildings 201 and 202

Equipment Supply

Design of Physical Protection Systems (Equipment), Casks

IN PROGRESS

Design of Andreeva Bay RW Facilities

Design of the Pontoon

Tests on the Cask Mock-up and Material

Supply of Equipment for Physical Protection Systems

FUTURE COMMITTMENTS

Construction of the Andreeva Bay Facilities and Storage Pad

Manufacturing of 10 Casks

Construction of the Pontoon