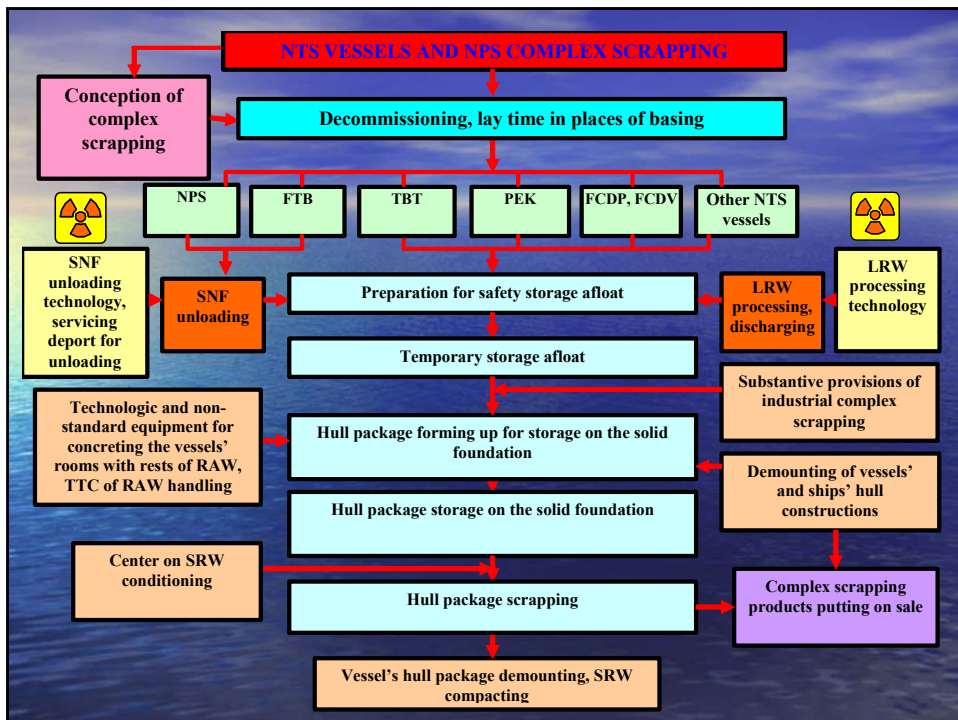


**IAEA CONTACT EXPERT GROUP WORKSHOP
on problem of the nuclear technological service vessels and the surface ships with
nuclear power installations scrapping**

**Circle of RAW and TW maintenance at NPS and NTS
vessels scrapping at the SRY "Nerpa".
Ensuring of radiating and ecological safety.**



Ecological safety

Nuclear safety is provided with

unloading of nuclear material from NPS reactors and NTS vessels' depositories. Prepared for storage objects are not nuclear dangerous.

Radiating safety is provided with

installation of additional biological protection upon results of radiating inspection with a view of non-exceeding of the scale-radiation doze of 100 mkZ/h from the hull on a distance of 1 m in all directions

reliable isolation of ionizing radiation sources and exception of migration of radio-nuclides from the source into environment by performance of the project documentation requirements during preparation of the object (additional bulkheads, anticorrosive covering, etc.)

Safety during toxic waste handling is provided with

industrial waste products localization, classification, collection and transportation for processing and burying

ecological monitoring for the air, ground, sewage and water areas conditions

Experience of NPS and NTS vessels scrapping at the SRY "Nerpa"

The SRY "Nerpa" has a huge experience of scrapping the NPS, including damaged ones:



NPS K-19



NPSMC "Kursk"



SSBN



Victor class NPS

The SRY "Nerpa" has scrapped all NPS multi-compartment units until recently stored afloat in Sayda Bay:



Multi-compartment unit afloat



Multi-compartment unit in dock

Experience of NPS and NTS vessels scrapping at the SRY "Nerpa"

The SRY "Nerpa" keeps the yards of the reactor compartments temporary storage afloat and on the stable ground and provides safe storage of more than 60 RC units;



TSY "Sayda"



RC TSY at the SRY "Nerpa"

The SRY "Nerpa" approves direct participation in implementation of the project on construction of RC long-term storage yard in Sayda Bay, which is created within the frameworks of the "Global Partnership..." program;



RC LTSY "Sayda"
under construction

Experience of NPS and NTS vessels scrapping at the SRY "Nerpa"

The SRY "Nerpa" repeatedly carried out dock repairs of NTS vessels basing in Northern region of Russia.



FTB "Imandra"



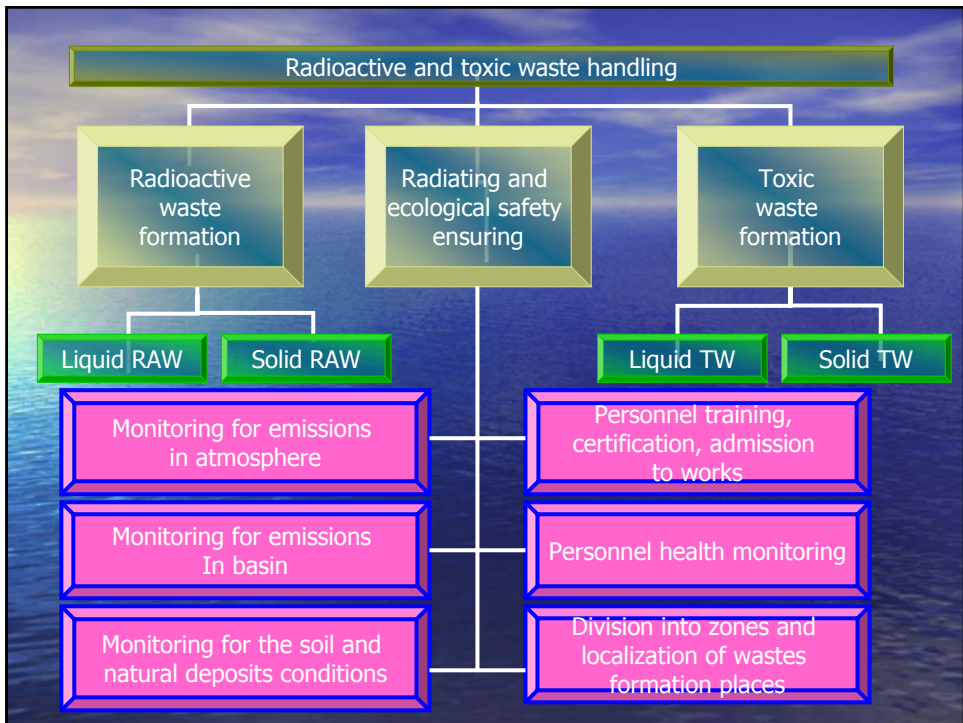
Malina class
FTB

The SRY "Nerpa" performed works on preparation of FTB "Lepse" and FTB PM-50 for safe storage afloat. The shipyard has developed the basic technological circuit and the basic technical solutions on FTB "Lepse" scrapping on its capacities.



Hall
package
PM-50





Radioactive waste handling

Radioactive waste products on a modular condition are subdivided onto liquid, solid and gaseous, and are divided onto categories according to the requirements of "Basic sanitary rules of the radiating safety ensuring" OSPORB-99 and SPORO-2002.

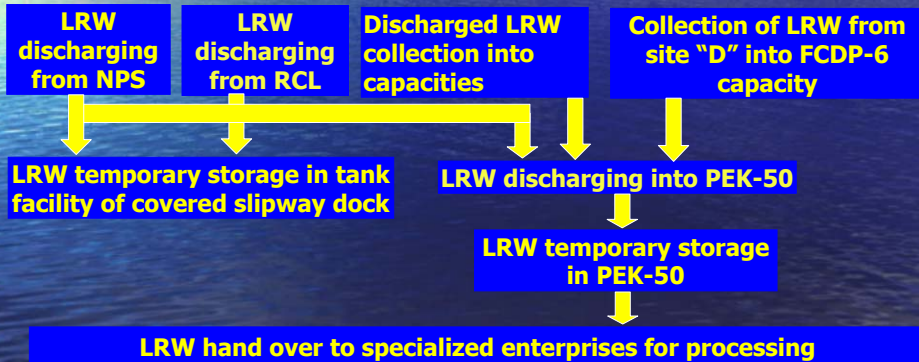
Classification of liquid and solid radioactive waste products by a specific radio-activity:

Waste product category	Specific activity, kBk/kg		
	beta-radiating radio-nuclides	alpha-radiating radio-nuclides	trans-uranous radio-nuclides
Low-active	less than 10^3	less than 10^2	less than 10
Mid-active	from 10^3 to 10^7	from 10^2 to 10^6	from 10 to 10^5
Highly active	more than 10^7	more than 10^6	more than 10^5

Liquid radioactive waste

During NPS and NTS vessels scrapping the sources of LRW formation are:

- Liquids from I и III circuits of SPI
- Liquids from drainage and biological protection tanks;
- Deactivation liquids;
- Liquids from the NTS vessels' special tanks;
- Radio-chemical laboratory liquids;
- Liquids after people washing and from special laundry.



Liquid radioactive waste

Basic technical infrastructure objects at the SRY "Nerpa" on LRW handling are:



tank facility of the covered slipway dock for the LRW collection and temporary storage;



floating capacities PEK-50 for the LRW temporary storage;



special capacities on FCDP for the LRW temporary storage;

stationary and temporary technological pipelines for the LRW reception and distribution;

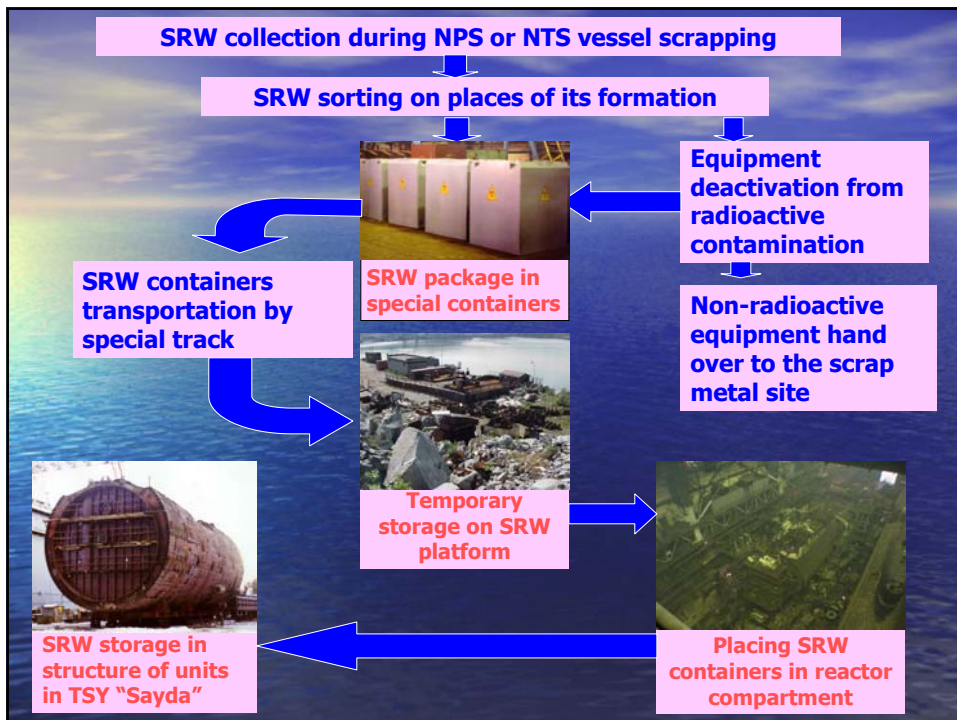
Solid radioactive waste

During NPS and NTS vessels scrapping the sources of SRW formation are :

- accessories, pipelines of special systems from ships with NPI and NTS vessels;
- equipment and metal constructions from MPS reactor compartment and NTS vessels' special rooms;
- technical equipment means, individual protection means, rags, plastic compound and other auxiliary means;
- fulfilled resource radio-nuclide sources, materials, wares, equipment, soil, and also hardened LRW, in which the specific activity of radio-nuclides is more than the values given in the "Radiating safety norms" NRB-99, and at unknown radio-nuclide structure it is more, than:
 - 100 kBk/kg for beta-radiating radio-nuclides;
 - 10 kBk/kg for alpha-radiating radio-nuclides;
 - 1 kBk/kg for trans-uranous radio-nuclides.

Approximate quantity of formed SRW at single NPS scrapping

SRW denomination	Approximate quantity, t	Specific activity kBk/kg
Demounted constructions	30,0-35,0	10^4 - 10^8
Planks, electrical cable, plastic compound, etc.	2,0-2,5	10^5
Technological equipping means	1,5-2,0	10^6 - 10^8
Working overalls, wiping, rags, etc.	0,5	10^4
Total	34,0-40,0	



Toxic waste handling

At NPS and NTS vessels scrapping:

- a) solid waste;
- б) liquid waste, sewage;
- в) emissions into atmosphere from regular gaseous environments;
- г) emissions into atmosphere from thermal cutting, from welding, from preparation to thermal cutting, from cable cutting.

Classification of the formed waste products by danger degree is carried out on the most dangerous component according to the requirements of the Russian Federation Ministry of Natural Resources "Criteria of the dangerous waste products reference to a danger class to natural environment". The waste products danger degrees are divided onto 5 danger classes accordingly:

- 1 – extremely dangerous;
- 2 – highly dangerous;
- 3 – moderately dangerous;
- 4 – low dangerous;
- 5 – practically harmless.

Waste products accommodation is made only in the sanctioned places coordinated with CGSEN-120 and allowed by nature protection bodies of Murmansk region. Discharge of any liquids into basins and reservoirs is strictly forbidden. Protection of an atmosphere is secured by local and stationary regular forced-air and exhaust systems with filters for catching the atmosphere polluting substances.

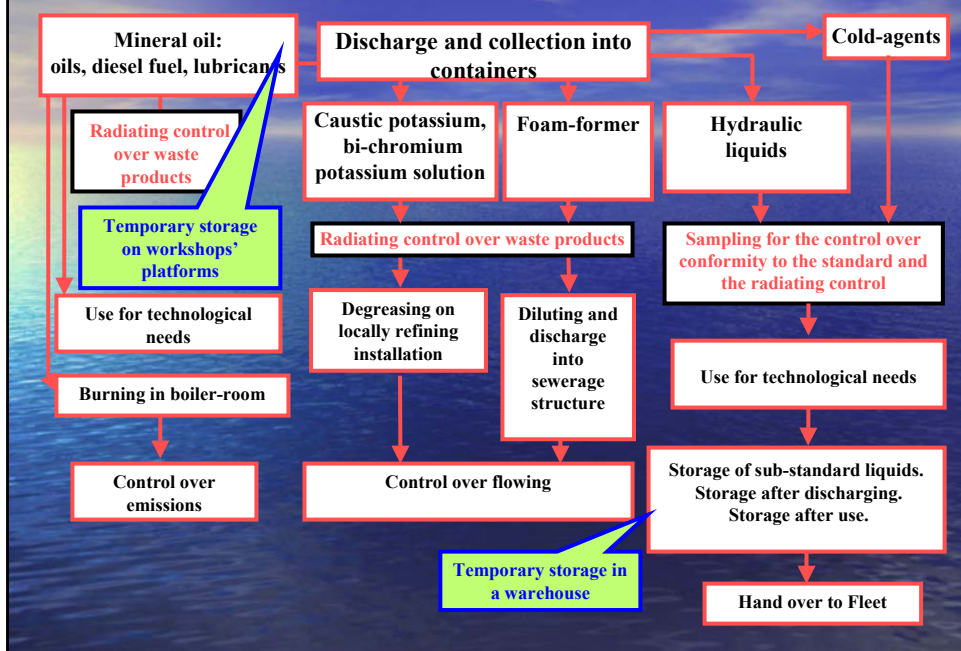
Liquid toxic waste

Spent liquids of ships' systems, lubricants of the equipment, mechanisms and devices concern to liquid waste products.

At spent liquids discharge from the scrapped NPS:

- a) regular technological means are applied;
- б) pipelines tightness for exception of leakages is provided;
- в) dry, cleared and tight containers are applied;
- г) containers are filled according to the norms of filling (for mineral oil (oil, diesel fuel etc.) - 95 %, for hydraulic liquids, cold-agent H4B, alkalis - 90 %);
- д) after filling the container should be tightly closed. The design of container should provide tightness, safety at reloading and transportation, an opportunity of discharging and monitoring of the liquids level. A material of container should be metal chemically proof to the concrete type of waste product. The container for mineral oil should be protected from static electricity.

Circuit of liquid toxic waste handling



Solid toxic waste

Waste products collection is made during performance of dismantling works directly on object, during equipment disassembly in workshops.

Waste products collection is made according to the danger class, dimensions (packages, pieces, crumb, dust), fire danger, reuse.

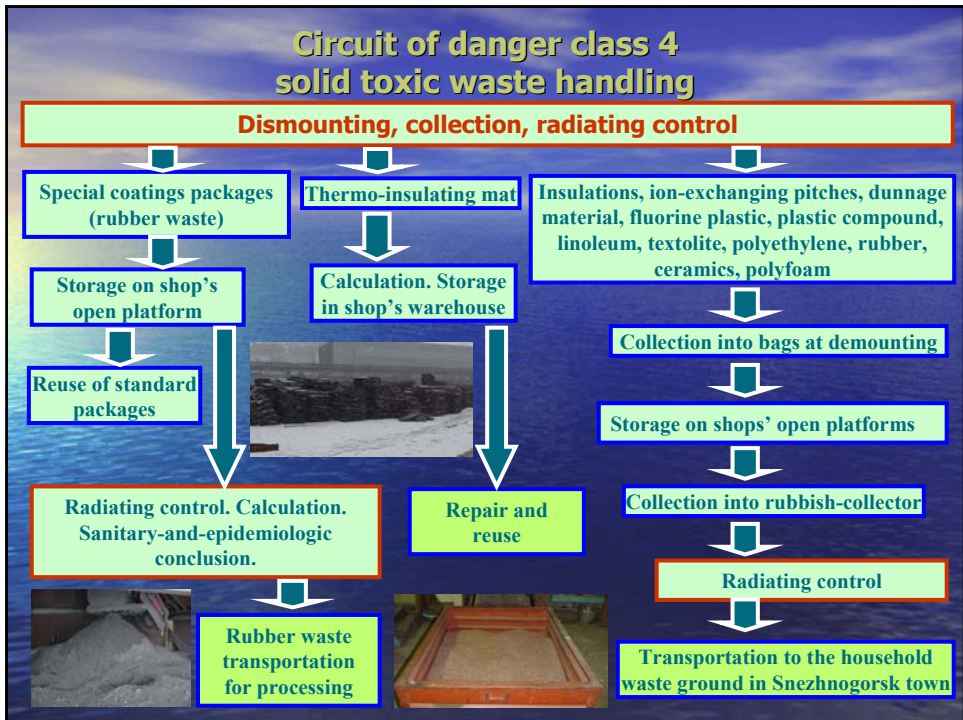
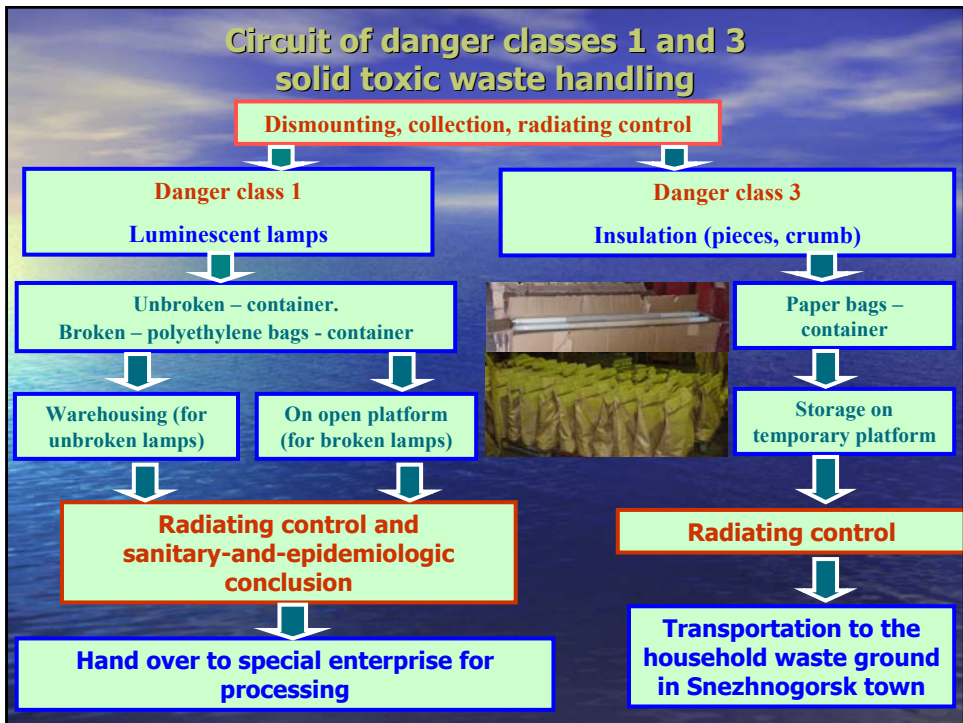
Waste products collection on the NPS in places of their formation is carried out:

- into boxes with preliminary packing in a brown paper or in densely tied up polyethylene bags - for luminescent lamps or broken luminescent lamps (danger class 1);
- into multilayered paper densely tied up bags or fabric bags - for dry waste products (pieces, crumb) on the basis of insulation FS);
- into pallets or containers – integral packages of special coatings (danger class 4).

Waste products collection with the purpose of accumulation on workshops' platforms is carried out:

- into pallets – integral packages of special coatings (danger class 4);
- into metal containers – asbestos containing and other waste products from bags (danger class 4);
- into metal containers with reliably closed covers on locks - wastes (danger classes 1, 2 and 3).

Containers for dangerous waste products collection (danger class 1, 2, 3) should correspond to the requirements of GOST 26319 with designation on an external surface of danger class signs in accordance with GOST 19433.



MEASURES ON RAW AND SNF HANDLING

LRW handling	SRW handling	SNF handling	Radiating monitoring
New LRW tank facility construction	Reconstruction of SRW temporary storage platform at the SRY "Nerpa"	Cargo-handling equipment site construction	Creation of the AMSRC system at the SRY "Nerpa" with the data distribution to the city, region, crisis center
Construction of floating capacities for LRW	Creation of SRW packaging site at the SRY "Nerpa"	FTB repair and securing its constant technical readiness at the SRY "Nerpa"	Stock of machine-tools in operation replacement. Radiometric and radio-chemical laboratories re-equipment
Deactivation site reconstruction	Solving problem of SRW conditioning centre creation in Murmansk region	FTB "Imandra" (OJSCo "MSCo") attraction to works on SNF unloading from NPS	Manufacture of filter-ventilating installations for reactor compartments and other SMZ
Introduction of new deactivation methods and means	Manufacture of certified containers for SRW at the SRY "Nerpa"		Mobile sanitary passes construction
	Purchase of motor-transport for SRW transportation		

MEASURES ON ECOLOGICAL MONITORING AND REDUCTION OF SRY "NERPA" INFLUENCE OVER ENVIRONMENT

Development of projects on objects scrapping	Infrastructure creation and reconstruction	Polluting factors monitoring
Development of sets of design and organizational documents (taking into account STS, EIE, TTC) for each NPS project for each enterprise	Solid TW processing site: - incinerator; - rubber and cable waste processing	Development of regulations on ecological safety secure during fulfillment of works with toxic waste
Development of sets of design and organizational documents (taking into account STS, EIE, TTC) for floating technical bases of recharging	Reconstruction of sewerage structures	Creation of uniform technological chains of the toxic waste handling over the region
Development of sets of design and organizational documents (taking into account STS, EIE, TTC) for technical bulk tankers (TBT for LRW)	Reconstruction of productive sites' ventilation systems. Reconstruction of galvanic, chemical refining and neutralization sites	Automated control over discharges into basins and emissions into atmosphere
Development of sets of design and organizational documents (taking into account STS, EIE, TTC) for surface ships with NPI	System of small polluting substances discharges' localization and coastal territories cleaning	Purchase of contemporary equipment for laboratories