

PRESENTATION

**LOCAL RADWASTE MANAGEMENT CENTRE AT FSUE SevRAO
BRANCH No 1 AT ANDREEVA BAY**

CEG WORKSHOP

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Summary

This presentation provides analysis and characteristics of radwaste (solid and liquid) accumulated at Andreeva Bay. Radwaste locations and volumes are described. OBIN solutions for radwaste handling are compared with the modifications made in the course of developing the Initial Data Pack (IDP). Proposals for radwaste transportation from Andreeva Bay to the conditioning centre at Saida Bay are reviewed.

1 Study of Quantity and Characteristics of LRW Accumulated at Andreeva Bay

1.1 LRW Characteristics and Analysis.

Study of LRW accumulated at Andreeva Bay was made by FSUE NIKIET in 2004 and FSUE NITI in 2007. Summarised data on the quantity and activity of the accumulated LRW were collected at the first stage. At the second stage physicochemical properties, anion and cation content were investigated; intervals of LRW specific activity changes were made more accurate. A summary of data on the volumes and activity of LRW accumulated at the Andreeva Bay Long-Term Storage Site are given in Table 1.

The results of the study are characterised by the following major attributes:

1. Bar chart 1 shows the distribution of accumulated water salinity against the facilities.

It can be seen from Bar chart 1 that the average salinity of LRW accumulated in the 2B SNF Tank is appr. 500 mg/litre, in the 3A Tank appr. 125 mg/litre, in the 2A Tank appr. 43 mg/litre, and appr. 170 mg/litre in Building 6. Such figures are typical of low saline water.

2. The distribution of hydrogen ion exponent (pH value) for LRW accumulated on the site is given in Bar chart 2.

Bar chart 2 shows that the average hydrogen ion exponent of LRW in the 2B Tank is 9.75 pH units, in the 3A Tank 8.7 pH units, in the 2A Tank 6.9 pH units, the average hydrogen ion exponent for the Building 6 LRW is 7.3 pH units. These values characterise alkaline and subalkali water.

3. The distribution of the suspended matter is shown in Bar chart 3.

It can be seen from Bar chart 3 that among all accumulated LRW significant quantity of suspended matter has been detected in the 2A Tank water only. Water in the rest of the facilities contains little suspended matter.

4. Radioactive nuclide activity distribution is given in Bar charts 4 and 5.

Bar charts 4 and 5 make clear the following:

- LRW in the 2A SNF Tank is classed as medium activity waste according to OSPORB-99 (The Main Sanitary Rules for Radiation Protection)
- LRW in the 2B SNF Tank is classed as low and medium activity category of waste
- LRW in the 3A Tank is classed as medium activity waste
- The 2V Tank LRW is classed as medium activity waste
- LRW in Tanks Nos 2, 3 and 4 in Building 6 is classed as low activity waste
- Water samples from the Building 6 basement are classed as low activity category of waste.

Having considered the results of the undertaken studies and the data obtained the following facts should be noted:

- The sampling of the SNF Tank cells is insufficient for reliable determination of the amount of LRW that contains alpha emitting radionuclides. Only seven of 3,099 cells with SNF in the dry storage tanks were checked for alpha activity. Analysis of a 2B Tank cell (cell No 920) showed that the level of specific volume alpha activity reached $1.0 \cdot 10^2$ Bq/kg.
- LRW in Building 6 Tanks 5 and 6 remains non-surveyed.
- LRW in the SRW storage facilities (Table 1 item 6) has not been investigated either.

Having studied the impact of the facts above on the subsequent activities the following can be noted:

- According to the Terms of Reference for the LRW processing workshop, medium activity water from the 2A, 2B and 3A Tanks will be preliminary decontaminated of radioactivity at a separate process plant until its specific activity reaches 1×10^6 Bq/kg. The location of the plant is envisaged as part of SNF management facilities. The performed sampling of the cells was not large in scope and may not have been representative which can cause errors when material balance and service life of the plant filters are assessed.
- According to the experts' evaluation the amount of LRW in the SRW storage facilities is appr. 1,750* cub.m. This is only 4.5% of the overall quantity of LRW to be generated, since appr. 38,200 cub.m. is expected to arise during the 15 years of operating SNF and radwaste management facilities. Thus, requirements for LRW processing facility are mainly predetermined by the necessity to process newly generated LRW. Liquid radwaste that has been accumulated at the SRW facilities so far does not have any significant influence on the design solutions.

Conclusions that can be made based on the results of the presented discussions are as follows:

- Results from LRW study carried out in 2007 are generally consistent with the data accepted under OBIN development.
- An additional sampling and survey of samples from SNF Tanks are required to obtain more accurate data on the amount of LRW that contains alpha emitting radionuclides. It can be done within the scope of designing a plant for LRW activity reduction.
- Appr. 3,000 cub.m. of accumulated LRW classed as low active subalkali, low saline, containing oil products and organic substances will be delivered to the LRW management workshop.

1.2 SRW Characteristics and Analysis.

Identification of the quantity and characteristics of SRW accumulated at the Andreeva Bay Site was made by FSUE NIKIET in 2004. It included a survey of SRW open storage areas and certain compartments of the underground stores. In 2007 SevRAO and Aspect Conversion jointly elaborated the data on the quantity of radioactive contaminated soil and location of radiation sources that make a significant contribution to the radiation situation. This was done during radiological and geological survey of sites for the SRW shelters.

SRW investigations included facilities listed in Table 2.

SRW inventory has been identified as a result of the survey. The quantity of each type of SRW was determined. The amount of low, medium and high activity SRW was identified. This was done for each SRW store.

Twelve groups of SRW were identified during the classification process. Characteristics of each waste group are completely different. Each group was designated with a letter. Classification of SRW stored at the Long-Term Storage Site is given in Table 3.

Overall amount of SRW broken down against types and activity classes is given in Tables 4 and 5.

Having considered the results of the undertaken studies and the data obtained the following facts should be noted:

- At present it does not seem possible to survey SRW in the facilities where Shelter No 2 will be built.

- Survey of the basements of the existing underground storage facility has not been carried out.
- There are no data on SRW in Tank no 6 in the LRW storage building.
- The design solution of the 7A Facility is not clear.
- The ‘old’ pier has been dismantled at the site. Amount of SRW generated as a result was not taken into account in the tables referenced above.

Having studied the impact of the facts above on further activities the following can be noted:

- Assessments of the total SRW quantity in the facilities that were not surveyed show that the amount of SRW there is unlikely to exceed 2,500 cub.m., or 14% of existing SRW, or 10% of the entire quantity of SRW processed within 15 years.
- 01.11.2006 the NP-069-06 regulatory document, paragraph 2.13 was amended. *‘Low active short-lived solid radwaste (soil contaminated with radioactive matter, large non-fragmented radioactively contaminated equipment and construction structures, solidified low active radwaste and other similar radwaste) can be placed for final disposal in trench-type radwaste disposal cells without containers’*. Thus, when soundly justified, SRW generated as a result of the old pier demolition can be buried without being previously delivered to the SRW processing workshop.
- According to FSUE GI VNIPIET, the volume of secondary SRW arising from operation of SNF, SRW and LRW processing workshops will make 7 740 cub.m., or 44% of the accumulated SRW. It should be noted that the characteristics of secondary SRW considerably influence process solutions for the SRW management workshop.

The following conclusions can be made based on the above:

- All accessible SRW onsite has been surveyed.
- Non-accessible SRW does not considerably influence selection of design solutions of the SRW management workshop.
- Data available on types and quantities of accumulated SRW are sufficient for designing.
- Twelve types of waste that differs in dimensions and activity categories can be found on the site (see Table 3). The variety of SRW types determines a necessity to use different containers and packages in the SRW management workshop.

2 OBIN Solutions for Radwaste Management

Environment remediation of the Long-Term Storage Site suggested in the OBIN envisages construction of an SNF management workshop, an SRW management workshop and LRW management workshop. All the workshops are to be supported by the required infrastructure facilities.

The main process and assembly solutions regarding radwaste management are given in Volume 3 Book 1, OBIN.

The solid radwaste management workshop will comprise:

- SRW processing workshop;
- Shelters 1 and 2 to be built over existing stores;
- Storage of conditioned low and medium activity radwaste;
- Storage of medium and high activity SRW.

The liquid radwaste management workshop will consist of:

- LRW processing building;
- active drains for LRW transfer.

2.1 OBIN Solutions for LRW Management.

During remediation of the Andreeva Bay Site the main part of liquid radwaste will be generated in the SNF management facilities, SRW management workshop and decontamination facilities for vehicles and equipment.

The following types of LRW will arise during operation of the SNF management workshop, LRW and SRW management facilities as well as auxiliary buildings and structures:

LRW to be generated at the SNF management facilities

- LRW in the area for fuel spillage removal;
- solutions that result from decontamination of SNF management premises;
- solutions arising from the decontamination of SFRA repackaging equipment;
- LRW removed from SNF Tanks and SFRA canisters.

LRW arisings from the SRW management workshop:

- LRW to be generated when SRW is decontaminated in the SRW processing facility and the Shelters;
- LRW from SRW dehydration at the dehydration plant;
- LRW arising from decontamination of equipment in the SRW management workshop;
- LRW from decontamination of rooms during the operation of SRW reprocessing facilities (rooms in buildings and structures of the SRW processing facilities)

LRW from LRW management workshop:

- LRW from decontamination of equipment in the LRW management workshop;
- LRW generated in the course of room decontamination during the operation of LRW processing workshop;
- LRW from the storage tanks

LRW from auxiliary buildings and structure:

- spent water samples and flushing solutions from the laboratory;
- LRW arising from decontamination of special purpose machinery in the buildings where it is monitored and washed;
- storm water (probably).

The total amount of liquid radwaste that will require processing within the period of site decontamination (15 years) will be ~ **48,000 cub.m.**

In order to process this quantity of radwaste a new building was planned to be built for active water treatment. The capacity will be 1 cub.m./hr for low saline LRW and 0.6 cub.m.for saline LRW.

The new water processing building was planned to be constructed in the footprint of the demolished boiler shop.

Liquid radwaste was supposed to be transferred from the SRW processing workshop to the LRW processing workshop via active drains, through the pipelines in the service pipeduct and part of existing active drains; tankers will have to be used to remove radwaste from the rest LRW generating facilities.

The new water processing building will include:

- three 100 cub.m. tanks to accept and store LRW in the short term;
- clearing plant;
- selective sorption and ozonation plant;
- softening plant;
- reverse osmosis plant;
- electro dialysis concentration plant;
- sorption afterpurification plant;
- plant for cementing liquid radwaste concentrates;
- gas treatment system;
- unit for preparing decontamination solutions;
- unit for certificate ('passport') issue for containers with conditioned LRW.

Equipment applied for LRW treatment has functioning analogues.

Solidified concentrates of liquid radwaste will be checked, certified and moved to the interim storage building in licensed NZK-150 and NZK-400 containers to be stored there for 50 years.

A plant for dewatering drums with radioactive soil was planned to be constructed to treat residue generated as a result of special purpose machinery decontamination.

Drums containing dehydrated radioactive soil will be placed into a stand (four at a time) to be dispatched to the interim storage building after relevant monitoring and certification.

High-active LRW was intended to be submitted for cementing without processing. After monitoring and certification the containers will be moved to the interim storage building to be stored there for 50 years.

Quality of water discharge will be compliant with admissible concentration limits stated in SanPiN 2.1.5.980-00 (Sanitary Rules and Standards).

This approach enabled to optimize a set and sequence of process methods for each liquid radwaste type, ensure radiological and environmental safety of processing, minimize the quantity of secondary SRW and achieve solution clearing to meet discharge requirements in accordance with the Rules for Coastal and Sea Water Protection from Pollution and NRB-99 (Radiation Protection Standards).

2.2 OBIN Solutions for SRW Management.

The solid radwaste management workshop will be located in the new building and the existing medium and high activity waste storage facility adjacent to the former.

The medium and high activity waste storage facility will include:

- unit for acceptance and monitoring of containerized SRW delivered for processing;
- unit for defrosting and dewatering of SRW containers.

The refurbished storage facility is supposed to house:

- containers with conditioned SRW (high and medium activity waste);
- unpackaged bulky SRW stored.

The radwaste processing workshop is supposed to comprise:

- SRW separation section;
- SRW compacting plant;
- steel SRW fragmentation section;
- steel SRW decontamination section;
- SRW conditioning unit;
- unit for certificate ('passport') issue for containers with conditioned SRW;
- auxiliary units and systems.

Capacity of the solid radwaste management workshop for steel SRW processing is determined by the capacity of the decontamination unit and is approximately 500 kg of SRW per day.

Capacity of the solid radwaste management workshop for non-steel SRW processing is determined by the capacity of the unit for defrosting and dewatering of SRW containers and reaches approximately 500 kg of SRW per day.

The SRW management workshop is to be equipped with package supplies. The packages will include equipment manufactured both in Russia and abroad, whose operation experience was positive during radwaste processing at similar facilities.

Conditioned SRW in NZK-130-1,5P, UKT1A-6, KT-2000 containers and drums will be placed into stands and after monitoring and certificate (passport) issue will be dispatched to the new interim storage for conditioned SRW to be stored there during 50 years.

Two shelters are planned to be built over existing underground radwaste storage facilities to improve radiological situation and ensure all-the-year round handling of radwaste.

For the purposes of preliminary SRW processing the shelters are to be equipped with special units and cubicles that will include decontamination and fragmentation equipment.

Robots will be used in certain areas.

Units (the main and auxiliary) for SRW retrieval from underground compartments were envisaged to remove SRW from the storage facilities.

Solidification of certain SRW types in the stores will be done in the SRW cementing area located there as well.

Input requirements for modules and units equipped with non-standard equipment are being developed by VNIPIET. Preliminary input requirements were developed by VNIPIET at the OBIN stage.

SRW containers, pre-prepared low active instrumentation and other SRW in primary packages are to be dispatched from the shelters to the SRW processing workshop for further processing with special-purpose vehicles.

Fragments of low-active concrete items generated in the course of decontamination are to be placed into KT type containers, cemented, monitored, certified and then transported to the interim storage for conditioned SRW for storage with special-purpose vehicles.

Medium and high activity equipment, whose dimensions allow its placement into NZK-type containers, is to be containerised, cemented, monitored, certified and then transported to the low and medium activity radwaste storage facility for storage with special-purpose vehicles.

Bulky medium and high activity equipment is to be delivered to the low and medium activity radwaste storage facility with special-purpose vehicles provided with removable shielding.

SRW retrieval units are to be applied to remove SRW from the underground compartments in Shelters 1 and 2 in order to reduce the quantity of waste in the SRW storage facilities.

Containers with processed low and medium activity waste will be stored in the interim storage for conditioned SRW. The storage capacity of the building will be appr. 6,000 cub.m.

Since combustible waste is also placed for storage, the interim storage for conditioned SRW has been assigned the V2 category according to Fire Safety Standards NPB105-03, and, therefore, will be equipped with automatic fire suppression devices.

Containers with conditioned low active short-lived radwaste are supposed to be stored in a specially equipped existing tunnel.

The tunnel storage capacity is appr. 8,000 cub.m.

Medium and high activity equipment will be stored in the existing storage facility after it has been refurbished.

Conditioned medium and high activity waste in shielded KT-6000 and NZK-400-0,3 containers is placed for storage onto the floor of the low and medium activity radwaste storage facility, whereas non-containerised waste is stored in the underground compartments.

Due to the lack of space to store low activity radwaste, part of the area in the low and medium activity radwaste storage facility (above the floor) might be allotted for containers with conditioned low activity radwaste.

At present the low and medium activity radwaste storage facility is filled with non-certified 1,5 cub.m. containers with solid low active radwaste. Metal scrap makes 90% of solid radwaste.

Removal of radwaste from the low and medium activity radwaste storage facility to ensure its consistency with relevant reference standards must be one of top-priority tasks.

At the final stages of site remediation including renovation of decommissioned structures containers with conditioned low active waste are assumed to be placed in a storage that might be built in the footprint of Shelter 2.

3 Modifications to Radwaste Management Strategy Adopted During IDP Development

Modifications to the radwaste management strategy have mostly been made necessary to meet the requirements of documents produced in the course of OBIN approval. The documents are as follows:

- Conclusion of the State Design Expert Review Department Ref. No. 66/271 dated 4/7/2007 regarding expediency of further development of the design documentation and recommendations of OBIN approval;
- Letter No 28-249 dated 15/03/2007 from Rosatom's Department for Decommissioning of Nuclear and Radiologically Hazardous Sites/ Facilities and SNF Management contained a proposal to change the SNF removal strategy developed in the OBIN.

A new Master plan of the Long-Term Storage Site at Andreeva Bay was developed as a result; the facilities of the SNF management workshop were changed; quantities of secondary radwaste to be processed became different.

In order to further progress improvement of the OBIN solutions taking into account the comments by the Main State Expert Review Directorate, OBIN solutions with regard to radwaste management were studied and revised with the Italian funding in 2007. It was done jointly by the Italian AKTEK Consortium, VNIPIET, Aspect Conversion and SevRAO.

Based on this study technical proposals were prepared to modify OBIN solutions and to be taken into consideration at the stage of detail designing of LRW and SRW treatment workshops.

Terms of Reference (TZs) have been developed for detail designs of LRW and SRW management workshops taking into account the technical solutions. The developed Terms of Reference (TZs) have been approved by Rosatom.

3.1 Modifications to LRW Management Strategy.

Briefly describing the changes to the OBIN solutions with regard to the LRW facility the following key aspects can be stressed:

- Input data on the quantity of secondary LRW to be generated at the SNF and SRW management workshops have been revised.
- A new location of the LRW processing workshop has been identified. The building will be surrounded by the facilities where the majority of LRW has been accumulated. Besides, it will be very close to the facilities where new LRW will be arising.
- Architectural and planning solutions of the LRW processing workshop have been changed. The facility is proposed to be built on several levels to make use of terrain peculiarities and little space on the site.
- The building will be populated with modular equipment.
- Engineering methods to be applied have been optimised. Part of low activity LRW is proposed to be submitted to prepare cement solution to fill containers with the prepared SRW. Part of the purified water is supposed to be collected in service water tanks and delivered to support works related to concrete SRW cutting or other processing operations.
- A mobile plant for low saline and low active LRW treatment will be applied. The mobile plant is suggested to support construction activities until the main workshop has been commissioned. Later, this plant will be used to process water from rain water accumulation tanks.
- Activity levels of LRW extracted from the SNF Tank cells will be preliminary reduced at a separate processing plant. LRW of high and medium activity will be processed to reach the

level of 1×10^6 Bq/kg. Low active LRW is to be delivered to the workshop for further processing. The activity reduction plant is being processed by Aspect Conversion as part of the SNF management workshop.

3.2 Modifications to SRW Management Strategy.

Amendments made to the OBIN solutions with regard to the SRW workshop are mainly as follows:

- Input data on the quantity of secondary SRW to be generated at the SNF and LRW management workshops have been revised.
- Facilities within the SRW management workshop have changed.
- Units for acceptance and defrosting of SRW containers will be in the SRW management workshop;
- A new location of the interim storage for conditioned SRW has been selected. It will be closer to the pier.
- Architectural and planning solutions of the SRW management workshop have been modified. The facility is envisaged on several levels to make use of terrain peculiarities and little space on the site.
- Equipment items in the SRW management workshop have been changed.
- The variety of container types to be used for SRW management has decreased.

Concise characteristics of the SRW management workshop facilities is given below:

Shelters 1 and 2 – shelters to be built over existing SRW storage facilities that are intended to minimise discharge into the environment of radioactive substances and ionising radiation emitted both during regular operation and as a result of emergency accidents; to prevent rain and snow water ingress into existing storage facilities; and to maintain conditions required for SRW retrieval from the underground stores and delivery to SRW management workshop for processing.

SRW processing workshop is envisaged to process and condition SRW accumulated in the existing storage facilities and generated in the course of SNF, SRW and LRW management.

Sanitary pass enables decontamination of the SRW workshop staff.

Interim storage for conditioned SRW – an interim storage facility for conditioned SRW – is intended for short-term storage.

Modular sanitary sluices – sanitary sluices near Shelters 1 and 2 – are intended to maintain controlled access when the controlled access area is established and functions during work activities in the contaminated areas of storage facilities. The sanitary sluices will be assembled of modules and used: by the personnel to put on additional PPE, to control workers' admission to the controlled access area and back; to decontaminate personnel; to monitor workers' skin and PPE.

Washing facility for special- purpose vehicles, machinery and equipment on the SRW pad – is intended to decontaminate the wheels and running gear of vehicles used in the SRW site; to decontaminate the outer surface of the machinery operated in the SRW management area and the inner surface of reusable casks and tanks, the entire surface of container and tank caps, and the outer surface of robots (manipulators).

Laboratory and service building – is intended to house and enable functioning of the following services:

- Class II process inspection laboratory;
- Laundry;
- Communication unit;
- Central control consol for the TV supervision system;
- ASKRO consol room.

Construction waste compound – is intended for waste of hazard classes IV and V, mainly construction debris arising from demolitions. Appr. 35,000 tons can be received annually. The design operation life of the compound is 7 years. The area is 27,825 sq.m.

Fixed pier – is intended to load SNF and radwaste on board a boat and ship steel SRW for remelting; ship conditioned SRW containers for long-term/final disposal and to receive cargoes during construction and decommissioning activities at the Andreeva Bay Site.

The following can be concluded when assessing the modifications described above:

Technical proposals developed by Italian and Russian experts clarify OBIN solutions, remove a number of bottlenecks and on the whole provide a good basis for developing design documents;

The modifications above have not influenced the concept of radwaste management at the Andreeva Bay Site.

4 Progress of Project for Establishment of Radwaste Management Facilities

As has been stated two documents have been developed and approved by Rosatom:

- Terms of Reference (TZ) for design development to build the LRW management workshop, and
- Terms of Reference (TZ) for design development of to build the SRW management workshop.

A joint Russian-Italian meeting was held on 18th February 2008 to discuss further prospects of developing detail design parts to be approved. Precontractual preparations are ongoing.

The major challenge at this stage of work is the issue of approval and separation of authority between the Russian and Italian contractors. It also includes identification of scope, organisations to be involved in the development process, preparation of the overall work programme.

The contract for development of the DDPA for SRW and LRW workshops is expected to be signed in April 2008.

5 Interfaces between Radwaste Management System at Andreeva Bay and at the other SevRAO Sites, Proposals for Optimisation

It has been suggested by Germany that a disposal centre should be established at Saida Bay. The assumption is that radwaste will be delivered to Saida Bay by sea. It will be desirable to note the bottlenecks of sea transportation which require attention:

- The existing mooring line at Saida Bay does not allow ship moorage; to enable this the design pier needs to be elaborated;
- Difficult navigation conditions between Andreeva Bay and Saida Bay do not allow using the ship only, without tug-boats, which will considerably increase the transportation costs.

Taking into account the points above it seems expedient to consider transportation by road vehicles, alongside with the sea transportation. It also has a number of drawbacks; however there are obvious advantages as well:

- Less container transshipment and cargo operations;
- Regular deliveries, and, therefore, no need for interim storage facilities for SRW at Saida Bay.

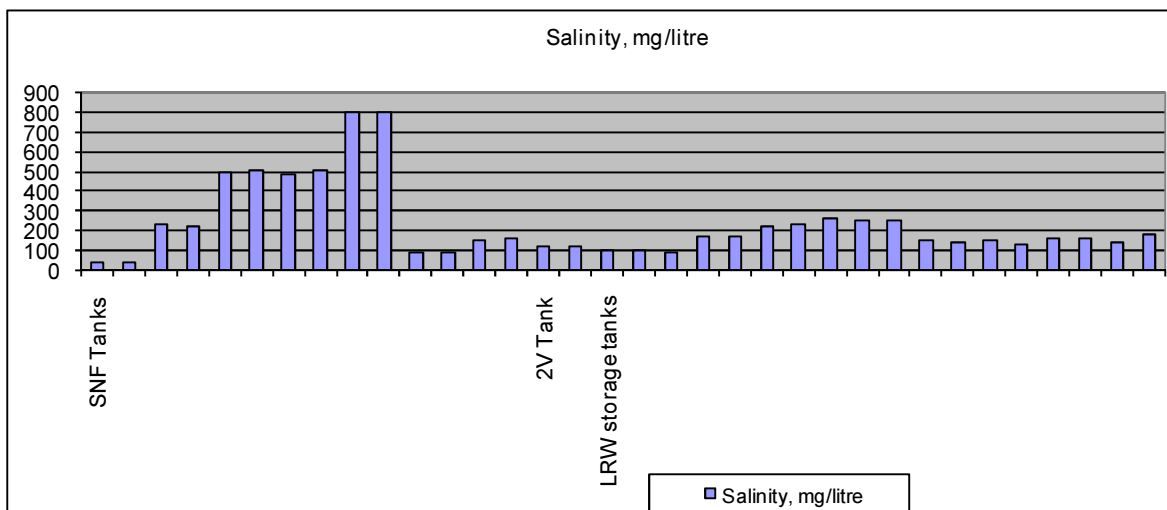
Plans of SRW management at Andreeva Bay do not thoroughly envisage high-activity waste handling issues. Locations of the areas where high-active waste will be handled and interim storage facilities have not been identified. In order to reduce the costs a single strategy of high activity radwaste management at SevRAO Branches 1 and 2 should be considered. It must include a possibility to deliver high-activity waste from Gremikha to Andreeva Bay to be prepared for shipment to the disposal centre at Saida Bay.

It should be noted that preparations for infrastructure development at Andreeva Bay are active. In this respect there is a need to decontaminate equipment, remove LRW from the storage tanks and SRW storage compartments and dismantle LRW tanks. In order to ensure radiation safety and reduce the costs it seems expedient to speed up the delivery of a modular LRW processing plant envisaged as part of the reprocessing facilities.

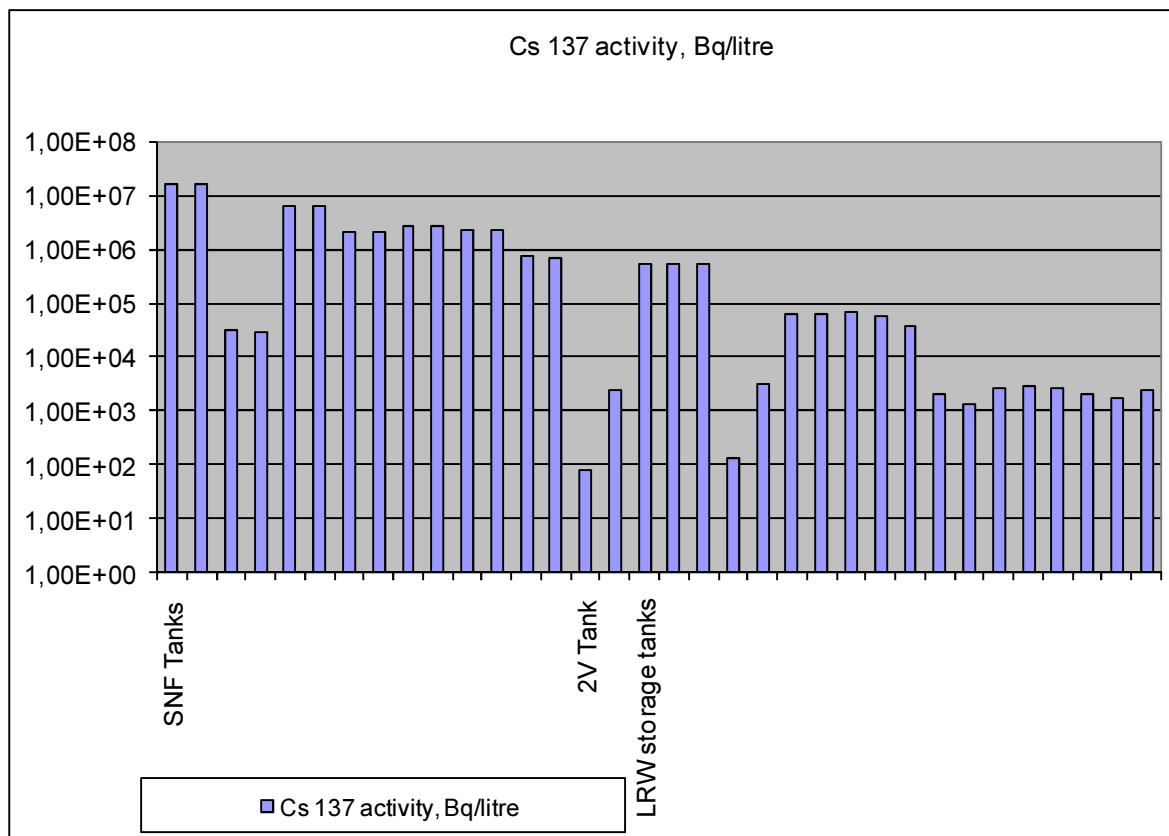
Table 1.

Facility	LRW Quantity, cub.m.	LRW Specific Activity, Bq/kg	LRW Category	Technical Characteristics
1 LRW storage facility	~1200	up to 10^7 (Cs-137) up to 10^4 (Sr-90) -	Low& medium activity	Low-saline water
2 SNF Tank cells	300	up to 10^9 (Sr-90)	Medium activity	Low-saline water
3 2V Tank	~110	up to 150 (Cs-137)		Low-saline water
4 Pipeduct	~10	up to 10^6 (Sr-90)	Low activity	Low-saline water
6 SRW storage facilities,	~1730*	up to 10^5 (Cs-137)	Low activity	Low-saline water
Total:	~3350			Low-saline water

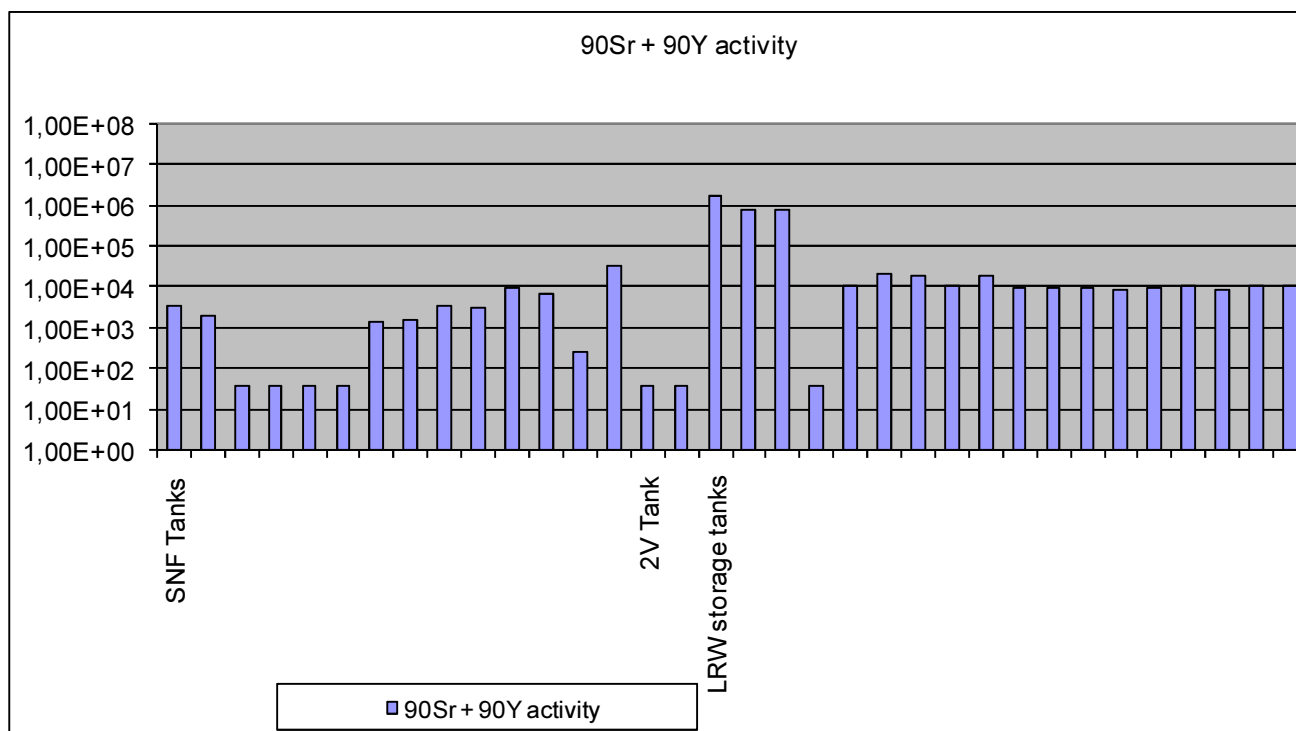
Bar chart 1.



Bar chart 4.



Bar chart 5.



CONCLUSIONS BASED ON LRW SURVEY RESULTS AT SEVRAO BRANCH 1

- Results from LRW study carried out in 2007 are generally consistent with the data accepted under OBIN development.
- An additional sampling and survey of samples from SNF Tanks are required to obtain more accurate data on the amount of LRW that contains alpha emitting radionuclides.
- Appr. 3,000 cub.m. of accumulated LRW classed as low active subalkali, low saline, containing oil products and organic substances will be delivered to the LRW management workshop.

Table 2

Facility Title	Characteristics	Function
<u>Facility 67</u>	A semiunderground concrete blockwork comprising over 600 cells. The flooded cells are covered with concrete plugs. A process hall is built of lightweight structures above the cells. There is a 16t overhead travelling crane in the hall. The hall is now filled with steel SRW containers; most cells are therefore inaccessible.	to store high and medium activity SRW
<u>Facility 67A</u>	A semiunderground concrete blockwork comprising 32 rectangular compartments and 200 cylindrical cells. The compartments and cells are covered with concrete plugs. The building is covered with a detachable gable steel roof. The cells and compartments contain water.	to store high and medium activity SRW
Facility 7	Semiunderground concrete blockworks that consist of cells of different sizes. The structures are covered with concrete blocks. SRW is stored on the ceiling cover.	to store high and medium activity SRW
Facility 7A	No accurate data on the structure. Containers with medium activity SRW are on the surface of the facilities.	to store low active SRW
<u>Facility 7B</u>	Four underground 8 cub.m. steel tanks. Over the tanks there are three 3.3m x 1.8m concrete cubicles 1.8m high, which house pumps, filling and discharge pipes, filters. The concrete boxes are diked with the soil from all the sides. The soil layer above the cubicles is 2m high.	to store low active combustible SRW
Facility 7B1	Underground concrete blockworks that consist of cells of different sizes. The structures are covered with concrete blocks. SRW is stored on the ceiling cover.	to store high and medium activity SRW
Facility 7V	A short-term 280 sq.m. SRW storage area covered with concrete slabs. Design documentation is not available as the facility was built without it.	to store low active SRW
Facility 7G	A short-term 220 sq.m. SRW storage area covered with concrete slabs and soil. Design documentation is not available as the facility was built without it.	to store medium activity SRW
Facility 7D	A ground concrete containment assembled of concrete slabs.	to store medium activity SRW
Facility 7E	An open area concreted to a 30cm depth.	to store bulky unpacked low activity SRW
montejus pad	A short-term 300 sq.m. SRW storage area covered with concrete road slabs.	short-term storage of SRW
area between facilities 7B1 and 7G	a non-equipped earthen area where different types of SRW is located	
area between facilities 7E and 7G	SRW covered with soil	
area between facilities 7 and 7A	a non-equipped earthen area where different types of SRW is stored in steel containers stacked on top of each other in three tiers.	

Table 3.

Group Designation	Radwaste Type	Examples of Radwaste in the Group
1	2	3
A	Containerised SRW stored in storage facilities (existing containers)	SRW containers of all types and dimensions in the open areas and inside storage facilities (except containers placed in The low and medium activity radwaste storage facility between 2001 and 2003)
B	Bulky thick-wall components	Assemblies of the 300xOK300 04MSB type, base casks etc. Mostly stainless steel thick-wall components that require specific methods to be conditioned.
C	Thin-wall components	Drums, tank equipment, cases, coaming slabs, rails, pipes.
D	Onsite containers	22, 22M, 24, 24M canisters
E	Concrete beams, slabs, blockwork	SRW generated as a result of eliminating emergency situation in Building 5
F	Concreted ion-exchange traps	Special methods need to be developed for conditioning
G	Non-concreted ion-exchange traps	Special methods need to be developed for conditioning
H	Soft combustible SRW (compressible)	PPE, bags, rubber, cables etc.
I	Hard combustible SRW (wood)	Broken wooden boxes etc.
J	Lead plates, slabs etc	SRW generated as a result of eliminating emergency situation in Building 5
K	High activity waste (control rods, ionization chambers, ion-exchange traps etc)	Special methods need to be developed for conditioning
L	Soil	Made-up ground in the open storage areas

Table 4 – SRW Types

Total Quantity of SRW, cub.m.	including:		
	combustible and non-combustible (compressible), cub.m.	non-compressible, cub.m	metal, cub.m.
17600	4280	3600	9720
100%	~24 %	~21 %	~55%

Table 5 – SRW Breakdown against Activity Categories

Total Quantity of SRW, cub.m.	including:		
	Low activity SRW	Medium activity SRW	High activity SRW
	<i>< 10³ kBq/kg or < 0,3 mSv/hr or from 5*10² to 10⁴ β-particles/(cm² min)</i>	<i>(10³ -10⁷) kBq/kg or (0,3-10) mSv/hr or from 10⁴ too 10⁷ β- particles/(cm² min)</i>	<i>> 10⁷ kBq/kg or > 10 mSv/hr or over 10⁷ β- particles/(cm² min)</i>
17600 cub.m. Total activity appr. 6,6x10 ¹⁴ Bq	~14020 m³	~2980 m³	600 m³
100%	~80 %	~17 %	~3%

CONCLUSIONS ON RESULTS OF SRW INVESTIGATION

- All accessible SRW on the site has been surveyed.
- Non-accessible SRW does not significantly influence on the selection of design solutions for the SRW management workshop.
- Available data on SRW types and volumes are sufficient for designing.
- Twelve types of waste that differs in dimensions and activity categories can be found on the site. The variety of SRW types determines a necessity to use different containers and packages in the SRW management workshop.

LRW GENERATION SOURCES

LRW to be generated at the SNF management facilities

- LRW in the area for fuel spillage removal;
- solutions that result from decontamination of SNF management premises;
- solutions arising from the decontamination of SFRA repackaging equipment;
- LRW removed from SNF Tanks and SFRA canisters.

LRW arisings from the SRW management workshop:

- LRW to be generated when SRW is decontaminated in the SRW processing facility and Shelters 1 and 2;
- LRW from SRW dehydration at the dehydration plant in the low and medium activity waste storage;
- LRW arising from decontamination of equipment in the SRW management workshop;
- LRW from decontamination of rooms during the operation of SRW reprocessing facilities (rooms in buildings and structures of the SRW processing facilities)

LRW from LRW management workshop:

- LRW from decontamination of equipment in the LRW management workshop;
- LRW generated in the course of room decontamination during the operation of LRW processing workshop;
- LRW from the storage tanks

LRW from auxiliary buildings and structures

MODIFICATIONS TO LRW MANAGEMENT STRATEGY

- Input data on the quantity of secondary LRW to be generated at the SNF and SRW management workshops have been revised.
- A new location of the LRW processing workshop has been identified.
- Architectural and planning solutions of the LRW processing workshop have been changed. The building will be populated with modular equipment.

- Engineering methods to be applied have been optimised.
- A mobile plant for low saline and low active LRW treatment will be applied.
- Activity levels of LRW extracted from the SNF Tank cells will be preliminary reduced at a separate processing plant.

MODIFICATIONS TO SRW MANAGEMENT STRATEGY

- Input data on the quantity of secondary SRW to be generated at the SNF and LRW management workshops have been revised.
- Facilities within the SRW management workshop have changed.
- Units for acceptance and defrosting of SRW containers will be in the SRW management workshop;
- A new location of the interim storage for conditioned SRW has been selected. It will be closer to the pier.
- Architectural and planning solutions of the SRW management workshop have been modified.
- Equipment items in the SRW management workshop have been changed.
- The variety of container types to be used for SRW management has decreased.

RW MANAGEMENT WORKSHOP FACILITIES

- Shelters 1 and 2 over existing SRW storage facilities;
- SRW processing workshop;
- Sanitary Pass at the entrance to the area of SRW processing facilities;
- Modular sanitary sluice 1 – a sanitary sluice for the personnel to enter the controlled access area near Shelter 1;
- Modular sanitary sluice 2 – – a sanitary sluice for the personnel to enter the controlled access area near Shelter 1;
- Laboratory and service building;
- Interim storage for conditioned SRW;
- Washing facility for special- purpose vehicles, machinery and reusable casks;
- Construction waste compound;
- Fixed PMK-67 pier.

BOTTLENECKS OF SEA TRANSPORTATION

- The mooring line at Saida Bay does not allow ship moorage; to enable this the design pier needs to be elaborated;
- Difficult navigation conditions between Andreeva Bay and Saida Bay do not allow using the ship only, without tug-boats, which will considerably increase the transportation costs