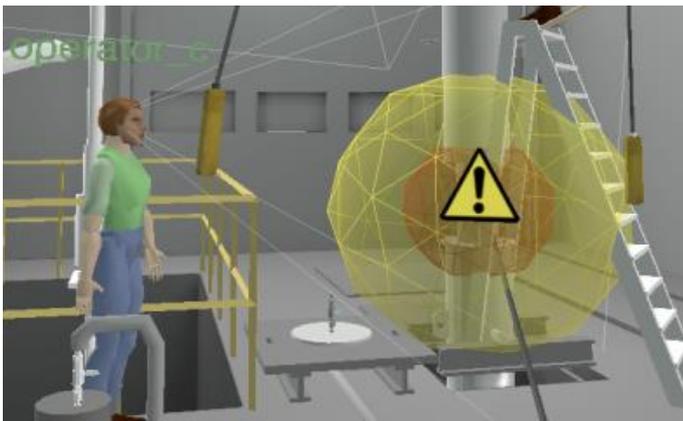




## Cooperation between Norwegian and Russian Regulatory Authorities

The Norwegian Radiation Protection Authority (NRPA) has cooperated for over 10 years with its sister authorities in the Russian Federation in the area of regulatory enhancement of nuclear safety culture and radiation protection concerning legacy sites and facilities. Of particular significance is the Site for Temporary Storage facilities in Andreeva Bay, other facilities and objects linked to the Barents Sea and areas affected by historic releases from Mayak PA. An important feature of the cooperation program has been the application of the results of targeted scientific research, including field work experiments and desk studies that combine to underpin regulatory activities.



Left: Software used for worker training (Federal Medical Biological Center (FMBC)).



Right: Works on decommissioning in Andreeva Bay (Rosatom)

Regulatory cooperation between the NRPA and the Federal Medical Biological Agency (FMBA) of Russia under Norwegian Nuclear Action Plan is financed by Norwegian Ministry of Foreign Affairs. Cooperation is designed to enhance the regulatory base required to address legacy situations on territory of Russian Federation.

The key elements and objectives of the ongoing and planned cooperation activities are:

- Continuing focus on compliance monitoring of regulatory requirements for radiation and nuclear safety during operations in 2015 - 2018 involving the removal of spent nuclear fuel from Andreeva Bay.

- Extended support to scientific and technical developments relevant to regulatory supervision in areas affected by historic accidents and operations, e.g. at Mayak PA.
- Application of gained experience to other nuclear legacy sites and facilities, both in the Russian Federation and in other countries.
- Progress made with industrial projects at Andreeva Bay has been met by parallel development of necessary regulatory guidance and requirements as well as further independent field investigations.

NRPA's regulatory program address a full set of issues related to nuclear and radiation safety. Under the 2012-2014 program completed projects

addressed coordination of emergency preparedness and response: radiation protection of workers, the public and the environment: control of discharges to the environment, and coherent regulation with other storage sites due to receive radioactive waste (RW) and spent nuclear fuel (SNF) recovered and transferred from temporary storage site Andreeva Bay. The main steps in the program were:

- Updating the Regulatory Threat Assessment Report of 2005, providing an updated evaluation of the key threats requiring regulatory attention, taking into account of the many important developments made in the last 10 years.
- Radiation safety of the public and the environment, analysis of the radiation situation in Andreeva Bay, assessment of changes in supervision areas and areas where remediation was not yet performed.
- Assuring personnel and public radiation safety during the legacy nuclear site remediation by developing regulatory guidance, "Radiation Protection of Workers and the Public during Remediation of Contaminated Areas".
- Further technical development, optimizing and implementing information-and-analytical system on radiation protection of workers (IAS RBP) for Andreeva Bay.
- Development of an updated strategy for emergency planning and response, procedures for regulators' interaction management.



*Performance of a training exercise in accident consequences mitigation at the Andreeva Bay. (Foto:FMBC)*

- Development of a methodology, technology and software for the safety culture assessment at Northwest Center for radioactive waste management "SevRAO" facilities and related regulatory response procedures. A key feature of the safety culture assessment was the ability to monitor professional reliability monitoring based on psychometric measurements, supported by interactive simulation training activities for hazardous operations, in the virtual environment.

## Ongoing projects

Cooperation between NRPA and FMBA is continuing, notably through the most hazardous SNF and RW recovery operations planned to take place at Andreeva Bay in the near future. The ongoing projects are focused on results of the updated regulatory threat assessment that has taken into account progress of technical, regulatory and infrastructure developments of the last 10 year, as well as relevant updated international recommendations and guidance.



*Meeting between SRC-FMBC (technical support organization of FMBA) and NRPA, Moscow, 27 February 2015. (Foto: Siegien-Iwaniuk)*

Thus, in February 2015 a new set of collaborative projects was initiated, as follows:

1. **Organization of emergency exercise with international participation on the assessment of the preparedness and**

## **response in the event of a radiological accident at the STS Andreeva Bay**

Learning from the experience of previous training in this area, the main objective is to assess the effectiveness of coordinated actions between all organisations involved in emergency response, and assess the technical and psychological preparedness of the medical team personnel and other emergency response groups to mitigate and minimize consequences of a radiation accident.

### **2. Radiation protection support during SNF and RW removal operations at STS Andreeva Bay**

Large-scale operations are planned to be conducted at Andreeva Bay, divided into three main stages:

- SNF removal from the Dry Storage Facilities
- Removal of spent fuel assemblies from Building number 5.
- Removal of RW accumulated during the previous operation of the facility and those being generated at the stage of SNF removal.

The aim is to enhance the regulatory functions of the regional inspectors under FMBA of Russia.

Tasks of the project include:

- Analysis of the proposed solutions and operational technology procedures for the SNF and RW removal; the compliance of these solutions and procedures with the current regulatory documents.
- Assessment of the radiation parameters in the main working areas.
- Assessment of doses to workers.
- Development of the activities to optimize protection of workers and the public.

### **3. Ecological assessment of environment during remediation of the Andreeva Bay**

Scientific support to regulatory developments is one of key points included into NRPA's regulatory cooperation. Furthermore, a growing trend in the development and application of radiation protection principles is recognition of the need to address explicitly both protection of human health and protection of the environment. With this in

mind, comprehensive analysis of the environmental conditions around STS and ecological assessment of the terrestrial ecosystems by bio-indication methods is an important tool in design of remedial activities and their regulation.

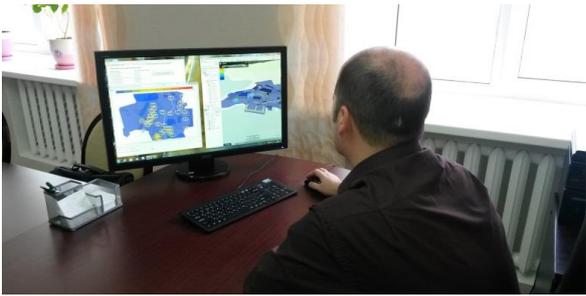


*Field work at STS Andreeva Bay: measurement and sampling (Foto: FMBC)*

Output with the completion of the project will be comprehensive and structured information on the dynamics of parameters describing the radio-ecological situation. This information can support the prognosis of the future migration and accumulation of radionuclides in the environment, which in turn supports the coherent assessment of possible radiation exposure to humans and other biota linked to different options for future management. This information is crucial for successful long-term regulation of remediation of contaminated areas at the Andreeva Bay.

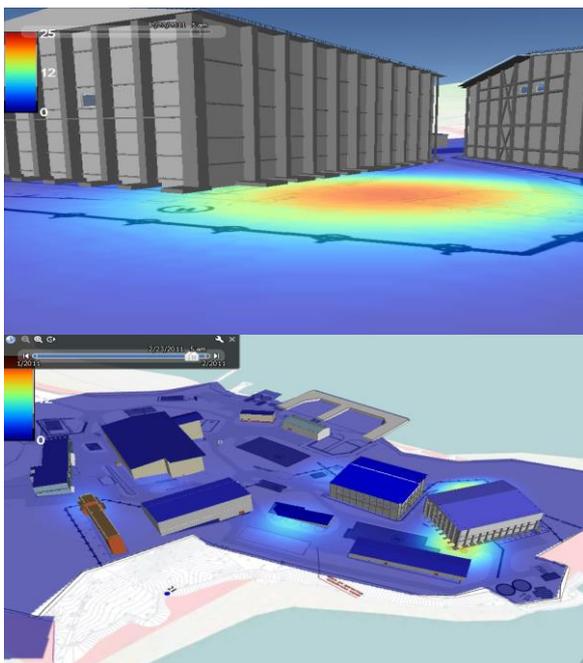
### **4. Scientific support of software system for the purpose of regulatory supervision of remediation works of the Andreeva Bay.**

In order to monitor the changing radio-ecological situation and to improve capabilities in radiation protection of workers, the Information and analytical software system on radiation protection of workers (IAS RBP) was developed.



*Local regulator in STS Andreeva Bay during work with IAS RBP (Foto: I.Mazur)*

This software provides the capability to solve tasks associated with regulatory control of workers radiation exposure and efficient regulatory supervision of STS remediation works connected with accumulation of measured data, calculation of radiation fields, input of the personnel routes and basic radiation situation analysis.



*Software system can visualize radiation field in time jointly with 3D models of buildings (Foto: I.Mazur)*

These tools have already been used in controlling exposures during operations being carried out in preparation for SNF and RW recovery. Its adaption and implementation to account for the changing situation during the particularly hazardous recovery operations is crucial for the optimisation of radiation protection during this work, and this is the main objective of the ongoing project.

#### 4. Improvement and implementation of the soft/hardware training complex for workers involved in the spent nuclear fuel and radioactive waste management.

This project is the third in the series concerning professional reliability monitoring. The previous two projects provided the most important measures to assure the performance reliability of workers involved in the SNF management. The main output was the pilot version of the expert-and-diagnostic information system for monitoring the risk of the performance reliability violation. The same software and hardware tools could be used to train the skills of the operators, taking into account the psycho-physiological implications of the activity. The objectives of the current project are to generate the soft/hardware training system and introduce it into the training/retraining program of workers involved in the SNF and RW management.

### Conclusions

The 10 years anniversary of regulatory cooperation between Norway and FMBA was marked in Moscow in April 2015. Results and achievements of the cooperation program were presented collectively to all the organizations and experts involved as well as invited guests.

Key outputs have included enhanced regulatory requirements and guidance for abnormal situations at nuclear legacy sites, supporting an efficient regulatory process to improve safety and protection during their remediation.

The FMBA-NRPA cooperation program has substantially enhanced regulatory documents and procedures to address legacy situations in the Russian Federation. This has been made possible by maintaining a long-term strategy over many years, coupled with trusting working relationships and openness and transparency. The next step is about supporting the practical implementation of that improved enhanced regulatory system.