Information on ISTC Project # 2111

V.Nikitin, V.Kamenev, NIPTB "Onega"

Project Title: "The Environment Assessment of Nerpa Ship Repair Complex (Including Facilities For Spent Nuclear Fuel and Radioactive Waste Handling), Development of the Proposals for Improving the Spent Nuclear Fuel and Radioactive Waste Management and the Ecological Safety"

The following Institutions were engaged in the Project:

- Federal State Unitary Enterprise ONEGA R&D Technological Bureau – Leading Institution
- Development Bureau of Engineering Industry (OKBM);
- Nerpa Ship Repair Yard;
- Institute of Geology of Ore Deposits, Petrography, Mineralogy and
- Geochemistry of Russian Academy of Sciences (IGEM RAS).

Foreign Collaborators:

- NNC Corporation Ltd.(The Great Britain)
- Sandia National Laboratories (The USA);
- TECHNICATOME (France);
- Storvik & Co AS (Norway);
- NUKEM GmbH (Germany).

The objective of the Project was the assessment of the environment effect of Nerpa Ship Repair Complex (including SNF and RW management facilities), the preparation of proposals for improving the Spent Nuclear Fuel and Radioactive Waste management and the ecological safety, the training of the specialists for advanced procedures of industrial waste management and methods of the environment effects assessment.

The following tasks have been tackled in the process of the Project execution:
Task 1 - The evaluation of the actual environment status at Nerpa Shipyard.
Task 2 - The determination and evaluation of the environment effects of the actual and potential sources of the radiation and chemical contamination at Nerpa Yard.
Task 3 - The forecasting of changes in the environment status depending on the actual and potential effects of the contamination sources.
Task 4 - Proposals for improving the plan of SNF and RW management at Nerpa to achieve and keep the ecologically reasonable environment condition
Task 5 -Specialists training abroad;
Task 6 -"Weapons" specialists retraining.

Nerpa Yard is located at the south shore of Kut Bay and Oleniya Guba of Kolsky Bay in Barents Sea.

Brief description of NPS dismantling process at Nerpa

NPS dismantling procedure at Nerpa includes following stages:

- NPS being at the holding area at the water area of Nerpa;
- NPS preparation for dismantling including the attendant works and SNF unloading;
- Three-compartment units cutting out, preparation for shipment and storage afloat;
- Aft and bow ends removal;
- Hull's structures cutting
- In the process of Project work execution the following problems have been specified with taken the NPS dismantling program expansion into account**:**
- The existent infrastructure of reactor compartment and RW management does not ensure the fulfillment of NPS dismantling program;
- The existent radiation monitoring system is to be improved.

In 2002 in the frame of the ISTC Project # 2111 there were observations on location and collection of the real data (83 samples of the soil and 36 samples of mosses) in order to study features of radionuclides and stable isotopes contaminated the landscape of the North part of Kolsky Peninsula.

Investigation results showed:

- The global and Chernobyl fallouts are the main sources of radioactive Cesium and Strontium contamination in the area of Nerpa;
- Nickel and Zapolyarny metal works are the reason of arsenic, sulfur, vanadium and heavy metals (Cu, Ni, Co, Zn и Pb) found in the soil and moss of the supervised area.

The assessment of contaminants dispersion in the air showed: releases from facilities of the Yard did not create the surface concentrations of contaminants exceed the maximum permissible concentration in the air with taken the background contamination into account.

Nuclear and radiation safety at Nerpa is achieved by the execution of the special technical and organizational measures.

At the same time there is a contamination of the top layer of the soil and moss near the Yard area with Cr, W, Mo, Pb, Zn, Ba, Cu because of the contaminants release generated in the process of the hull's structures cutting.

Specialists training abroad

In October 2002 there was a training for some Russian specialists in TECHNICATOME (France) and NNC Corporation Ltd. (the Great Britain) engaged in NSF and RW management in accordance with the ISTC Project # 2111.

It is planned to improve the RW management system and to increase the ecological safety of the Yard in order to prepare the Yard for detailed program of NPS dismantling (6-8 Submarines/year). Concrete measures are mapped out:

a) reconstruction of RW management infrastructure at Nerpa including:

- reconstruction of SRW interim storage facility;
- reconstruction of LRW management infrastructure;

- reconstruction of decontamination facility;

b) creation of the infrastructure for reactor compartment management including:
- construction of site for one-compartment units interim storage at the slipway plate of Nerpa;
- reconstruction of the interim storage facility for floating units in Saida Bay;
- construction of one-compartment units long-term storage facility at on-shore site of Saida Bay;

c) Execution of works concerning the environment impact reduction and ecological monitoring improvement including:
- Reconstruction of ventilation system in the covered-in berth and repair shop;
- Development of the Project and construction of the regional facility for toxic waste treatment;
- Reconstruction of waste-water drainage and local treating facilities;
- Central laboratory equipping with devices for gas analysis;
- Creation of automated radiation monitoring system at facilities and territory of Nerpa.

Proposals for new ISTC project on risk assessment

V.Nikitin, V.Kamenev, NIPTB "Onega"

Project Title: "The Assessment of Radiation and Insurance Risks of Nuclear Powered Submarines Dismantlement, SNF and RW Management in Severodvinsk."

Brief Title: "Risks"

Project Summary

Russia has constructed more than 250 Nuclear Powered Submarines (NPS) at the end of the 20th century and became the holder of the biggest nuclear fleet in the world. More than 190 NP Submarines have been decommissioned in accordance with the international agreements and now they are to be dismantled. The intensive NPS dismantling stipulates the importance and urgency of staff, population, and environment radiation protection.

The risk assessment and analysis is considered as one of the main mechanisms of managerial decisions making in the area of population and environment safety. The expansion of NPS dismantling program leads to the increase of nuclear and radiation hazardous operations. Under these conditions it is very important to ensure personnel, population, and environment safety. Nevertheless, there are no methodological approaches to the risk assessment and safety management for Nuclear Powered Submarines and Surface Ships dismantling.

The objective of the Project is the complete assessment of the safety on the basis of:

- Indices of the radiation risk of decommissioned NPS dismantling stages;
- Technological procedures of Spent Nuclear Fuel (SNF) and Radioactive Waste (RW) management;
- Development of recommendations concerning the radiation risk decrease;
- Assessment of the insurance risk.

Zvezdochka Ship Repair Yard is the Project leading institution.

Project duration is 24 months.

"Weapon" specialists from Zvezdochka Ship Repair Yard, Onega R & D Technological Bureau, OKBM, IGEM RAN, Krylov Institute, and IBRAE RAS with the participation of experts from Kurchatov Institute having great experience in NPS dismantling will be engaged in the Project.

The following foreign companies are proposed to participate in the Project as collaborators:

- Sandia National Laboratories (the USA);
- NNC Corporation Ltd. (the Great Britain);
- TECHNICATOME (France);
- NUKEM GmbH (Germany);
- Storvik & Co AS (Norway);
- Serco Assurance (the Great Britain).

The following tasks should be carried out in the process of the Project fulfillment:

- The analysis of the radiation risk methods concerning NPS dismantling, SNF and RW management procedures in Russia and abroad;
- The safety assessment of the existent procedure of NPS dismantling in Severodvinsk;
- The safety assessment of the existent procedure of SNF management in Severodvinsk;
- The safety assessment of the existent procedure RW management in Severodvinsk;
- The assessment of the radiation personnel and population risks in the process of NPS dismantling in Severodvinsk;
- The assessment of the radiation staff and population risks in the process of SNF management facilities operation in Severodvinsk;
- The development of proposals for radiation risk decrease by NPS dismantling, RW and SNF management at Zvezdochka Shiprepair Yard with possible application at the enterprises of Rossudostroenie;
- The assessment of the insurance risk for population by NPS dismantling and in the process of SNF management facilities operation in Severodvinsk;
- The preparation of proposals for the insurance and reinsurance of the civil liability of the enterprises of Rossudostroenie in accordance with the international law system.

The implementation of this Project will allow to develop proposals concerning the radiation risk reduction, SNF and RW management by NPS dismantling, to optimize NPS dismantling technological procedures and SNF and RW management processes regarding nuclear and radiation safety. It is up to the ISTC's objectives and tasks.

The ISTC Project #2111

"The Environment Assessment of Nerpa Ship Repair Complex (Including Facilities For Spent Nuclear Fuel and Radioactive Waste Handling), Development of the Proposals for Improving the Spent Nuclear Fuel and Radioactive Waste Management and the Ecological Safety"

Objective of the Project

The assessment of the environment effect of Nerpa Ship Repair Complex (including SNF and RW management facilities), the preparation of proposals for improving the Spent Nuclear Fuel and Radioactive Waste management and the ecological safety, the training of the specialists for advanced procedures of industrial waste management and methods of the environment effects assessment

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Project duration is 18 months

Project breakdown structure

- Federal State Unitary Enterprise ONEGA R&D Technological Bureau
- Development Bureau of Engineering Industry (OKBM)
- Nerpa Shiprepair Yard;
- Institute of Geology of Ore Deposits, Petrography, Mineralogy and Geochemistry of Russian Academy of Sciences (IGEM RAS)

Collaborators

- NNC Corporation Ltd (the Great Britain);
- Sandia National Laboratories (the USA);
- TECHNICATOME (France);
- Storvik & Co AS (Norway);
- NUKEM GmbH (Germany)





Project Tasks

- The evaluation of the actual environment status at Nerpa Shipyard;
- The determination and evaluation of the environment effects of the actual and potential sources of the radiation and chemical contamination at Nerpa Yard;
- The forecasting of changes in the environment status depending on the actual and potential effects of the contamination sources;
- Proposals for improving the plan of SNF and RW management at Nerpa to achieve and keep the ecologically reasonable environment condition
- Specialists training abroad;
- "Weapons" specialists retraining.

Stages of NPS dismantling at Nerpa

- NPS being at the holding area at the water area of Nerpa
- NPS preparation for dismantling including the attendant works and SNF unloading;
- Three-compartment units cutting out, preparation for shipment and storage afloat or one-compartment unit on-shore storage ;
- Aft and bow ends removal

Submarines are at the holding area

SNF unloading

Three-compartment unit

One-compartment unit

Gas cutting of hull's structures

Hull's structures cutting on Harris guillotine

Cable shredding installation

Interim storage site at Saida Bay

Specialists training abroad

Training was held in October 2003 at TECHNICATOME and NNC Corporation Ltd.

France. Cherbourg. Lecture at Military College

The Great Britain. Knutsford. Lectures at NNC Corporation Ltd.

Results

- The existent infrastructure of reactor compartment and RW management will not be able to ensure the fulfillment of NPS dismantling program till we put measures given in the next slide into effect;
- The existent radiation monitoring system is to be improved.
- Observations on location and collection of the real data (83 samples of the soil and 36 samples of mosses) in order to study features of radionuclides and stable isotopes contaminated the landscape of the North part of Kolsky Peninsula showed:

  - The global and Chernobyl fallouts are the main sources of radioactive Cesium and Strontium contamination in Nerpa;

  - Nickel and Zapolyarny metal works are the reason of arsenic, sulfur, vanadium and heavy metals (Cu, Ni, Co, Zn и Pb) found in the soil and moss of the supervised area.

- Releases from facilities of the Yard did not create the surface concentrations of contaminants exceed the maximum permissible concentration in the air.
- Nuclear and radiation safety at Nerpa is achieved by the execution of the special technical and organizational measures.
- There is a contamination of the top layer of the soil and moss near the Yard area with Cr, W, Mo, Pb, Zn, Ba, Cu because of the contaminants release generated in the process of the hull's structures cutting.

Measures

It is planned to improve the RW management system and to increase the ecological safety of the Yard in order to prepare the Yard for detailed program of NPS dismantling (6-8 Submarines/year). Concrete measures are mapped out:

a)) reconstruction of RW management infrastructure at Nerpa including:

-reconstruction of SRW interim storage facility;

-reconstruction of LRW management infrastructure;

-reconstruction of decontamination facility;

b) creation of the infrastructure for reactor compartment management including:

-construction of site for one-compartment units interim storage at the slipway plate of Nerpa;

- reconstruction of the interim storage facility for floating units in Saida Bay;

-construction of one-compartment units long-term storage facility at on-shore site of Saida Bay;

c) Execution of works concerning the environment impact reduction and ecological monitoring improvement including:

-reconstruction of ventilation system in the covered-in berth and repair shop;

-development of the Project and construction of the regional facility for toxic waste treatment;

-reconstruction of waste-water drainage and local treating facilities;

-central laboratory equipping with devices for gas analysis;

-creation of automated radiation monitoring system at facilities and territory of Nerpa.

The Assessment of Radiation and Insurance Risks of Nuclear Powered Submarines Dismantlement, Spent Nuclear Fuel and Radioactive Waste Management in Severodvinsk

Objective of the Project

Assessment of radiation risk of process stages of NPS dismantlement, SNF and RW management

Development of recommendations concerning radiation risk decrease and insurance risk assessment

Project duration is 24 months

Project Breakdown Structure

Zvezdochka SPA is a Leading Institution

Participating Institutions

IGEM RAS

IBRAE RAS

State Unitary Enterprise "Krylov Research Institute"

International Center of Ecological Safety

Collaborators

Sandia National Laboratories (the USA)

NNC Corporation Ltd. (the Great Britain)

Serco Assurance (the Great Britain)

TECHNICATOME (France)

Nukem GmbH (Germany)

Project tasks

- The analysis of the radiation risk calculation methods for staff, population and environment used in Russia and abroad;
- The assessment of NPS dismantling safety in Severodvinsk;
- The assessment of SNF management safety;
- The assessment of RW management safety in Severodvinsk;
- The assessment of radiation risks of NPS dismantling process in Severodvinsk;
- The assessment of radiation risks of SNF management system in Severodvinsk;
- The assessment of radiation risks of RW management system in Severodvinsk;
- The assessment of insurance risk for population in the process of NPS dismantlement and SNF and RW management facilities operation in Severodvinsk;
- The development of proposals concerning radiation risks decrease at Zvezdochka with application at other enterprises of Rossudostroenie, the preparation of proposals for the insurance and reinsurance of the civil liability of the enterprises of Rossudostroenie in accordance with the international law system.

Expected Results:

- Proposals concerning radiation risk decrease in the process of NPS dismantlement, SNF and RW management
- Optimization of technology processes of NPS dismantlement, SNF and RW management
- The preparation of proposals for the insurance and reinsurance of the civil liability of the enterprises of Rossudostroenie in accordance with the international law system