FINAL REPORT

PEER APPRAISAL OF THE ARRANGEMENTS IN THE ARCHANGELSK REGION (RUSSIAN FEDERATION) REGARDING THE PREPAREDNESS FOR RESPONDING TO A RADIATION EMERGENCY

04 – 14 July 2011
Archangelsk Region, Russian Federation

International Atomic Energy Agency

ACKNOWLEDGEMENT

The mission team gained access to all principal organizations, which provided excellent cooperation and valuable input at all levels. The time spent with organizational counterparts in Moscow, Archangelsk and Severodvinsk was extremely productive. The professional interest and involvement on the part of representatives from critical response organizations with whom the mission team interacted was vital to the success of this mission. The mission team wishes to extend its special appreciation for the positive and active involvement of Professor L. A. Bolshov, Director of Nuclear Safety Institute of the Russian Academy of Sciences (IBRAE RAN), for the excellent preparation of the mission and and Mr. V.V.Shishov, the Deputy Governor of the Archangelsk Region on natural resources and ecology, for providing access and consultation opportunity to all the organizations playing important roles in the regional nuclear or radiological emergency preparedness and response system. The visits provided valuable insights into the challenges faced by the regional government, as well as the locally operating federal institutions to provide the necessary capabilities to cope with the consequences of any nuclear or radiological accident.

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1. INTRODUCTION

1.1. BACKGROUND

The obligations, responsibilities and requirements for preparedness for and response to radiation emergencies are set out in the Safety Standards, No. GS-R-2 Requirements for "Preparedness and Response for a Nuclear or Radiological Emergency" [1]. The IAEA General Conference, in resolution GC(46)/RES/9, encourages Member States to "implement the Safety Requirements for Preparedness and Response to a Nuclear or Radiological Emergency".

In 2003, the IAEA published a document titled "Method for Developing Arrangements for Response to a Nuclear or Radiological Emergency" (EPR-METHOD) [3], with the aim of fulfilling, in part, the IAEA's function under Article 5 of the Assistance Convention to provide a compendium of best practices for planners aiming to comply with IAEA Requirements [1]. These documents are the most important IAEA standards to be used when building up the national nuclear and radiological emergency response system. (Further guidance on how to reach better compliance with the Requirements [1] are given in the IAEA Safety Guide No. GS-G-2.1 "Arrangements for Preparedness for a Nuclear or Radiological Emergency" [2]).

While each Member State is responsible for conducting periodical appraisal of its emergency preparedness and response capabilities, the IAEA can also conduct, at the request of the Member State, an independent Emergency Preparedness Review (EPREV).

EPREV missions may assess a country's Emergency Preparedness and Response (EPR) capabilities in its totality or may focus on specific aspects of the subject. In the case of this EPREV Peer Appraisal Mission (mission), the IAEA was requested to review the situation regarding nuclear and radiological emergency preparedness in a specific region (Archangelsk region) after completion of the targeted EPR system upgrading project in the region.

The Northern Dimension Environmental Partnership Support Fund (NDEP) was established in 2002 to tackle major environmental challenges in north-western Russia. The NDEP Nuclear Window deals specifically with the legacy of the Soviet fleet of nuclear submarines, ships and coastal maintenance bases. The NDEP is managed by the European Bank for Reconstruction and Development (EBRD).

One of the important projects funded by the NDEP Nuclear Window was the enhancement of the radiation monitoring and emergency response in the Archangelsk Region (NDEP-008 project).

The main objective of the project was the modernization of an early warning system on sites where nuclear submarine decommissioning, spent nuclear fuel (SNF) and radioactive waste (RW) management activities are being undertaken. The objectives also encompass establishing the means to ensure effective response capabilities to manage radiation emergencies and mitigate their consequences in the region.

An important goal of the project was also to ensure provisions for comprehensive information for the local population and authorities as well as for the international public and authorities on the radio-ecological situation including accidental releases in the region.

The Government of the Archangelsk region was the Grant Beneficiary and the Energy Safety Analysis Centre of Nuclear Safety Institute of the Russian Academy of Sciences (ESAC IBRAE RAN) was the main contractor (contract signed on 5 March 2009). The project was about to be completed in September 2011.

Following the suggestion of EBRD, the Russian authorities have requested the IAEA Emergency Preparedness Review (EPREV) mission. EBRD fully supported this initiative and was convinced that important lessons can be learnt from this exercise.

In the letter dated 10 October 2010, the Deputy Director General of ROSATOM, under Article (5) (a) of the Assistance Convention, requested IAEA assistance in assessing emergency preparedness and response arrangements in the Archangelsk Region of the Russian Federation (RF) (further referred to as the Region). In this regard, it was requested that the IAEA should conduct a peer review vis-à-vis the relevant international standards.

Upon the above request of the RF and following the relevant IAEA Guidelines (Emergency Preparedness Review Team Guidelines), a well-defined appraisal procedure was initiated. This included the following steps:

- During January and February of 2011 the Terms of Reference (ToR) were developed and adopted in cooperation with the project counterpart, Energy Safety Analysis Centre of IBRAE RAN (ESAC IBRAE RAN). The ToR was approved by the Government of the Archangelsk Region and the State Corporation "Rosatom".
- The mission was implemented during the period 04 – 14 July, 2011.

The overall objective of this mission was the assessment of compliance of the available EPR system with international standards, specifically with recommendations of the IAEA Safety Standards Series document No. GS-R-2 [1].

The requested assessment was limited to nuclear and radiological emergency preparedness of the Region, with special regard to the situation at facilities of threat category I and II. Consequently the specific objectives of the mission were as follows:

1. To provide an assessment of the Region's capability to respond to possible nuclear and radiological emergencies, taking into account the specific conditions of the Region. (This also involved observing a comprehensive emergency exercise carried out during the EPREV mission.)
2. To assist the Region in the development of interim arrangements to promptly respond to a nuclear or radiological emergency. This includes suggesting steps that can be taken immediately to better use existing response capabilities.
3. To provide a basis upon which the Region can develop a longer-term programme to enhance their ability to respond to nuclear and radiological emergencies.

In addition to the usual issues above which the IAEA normally assesses in similar missions, there was strong interest in determining the level of compliance between the objectives of the NDEP-008 project and the relevant international requirements regarding response to nuclear and radiological emergencies.

1.2. SCOPE

The mission was carried out in accordance with the guidelines developed for the EPREV services. As part of the methodology, a questionnaire was filled out, addressing the main issues and requirements of GS-R-2 [1].

Emergency arrangements were assessed at local and regional levels, specifically:

- Emergency management;
- Overall emergency preparedness;
- Law enforcement;
- Radiation protection;
- Medical response;
- Public information;
- Regional capability to support and provide training to local response teams.

Although the mission was related to the NDEP-008 project, the mission's scope of activity extended beyond the scope of the project in the sense that more general aspects (e.g. threat assessment, legal framework, assignment of responsibilities, functional and infrastructural requirements, training and exercises etc.) were also addressed. The NDEP-008 project was considered only with regard to its impact on the emergency preparedness status in the Region. However, a detailed assessment of the project implementation was not the task of the mission.

The review consisted of:

- reviewing and verifying the statements (Performance Indicators) made by the RF counterpart by filling out the self-assessment questionnaires;
- determining if the arrangements for preparedness and response for radiation emergencies within the Region were in conformity with the International Requirements [1]. (In this context, a "radiation emergency" means the same as a "nuclear or radiological emergency".);
- identifying methods and means of meeting the International Requirements (in short term, as well as in longer term) and possible other good practices. The EPR-METHOD [3], the EPR-FIRST RESPONDERS [4] and the expertise of the mission team members provided the basis for these recommendations.

The review mission was designed to cover all aspects of arrangements for emergency preparedness and response and included: on-site (facility), off-site (municipal/local) and regional emergency response and preparedness arrangements for all radiation emergencies that may affect the Region.

When determining the scope of the mission, certain limitations had to be taken into consideration: the mission had to be completed within nine working days, which included also time to be allocated for participation in an emergency exercise. In order to focus the effort and to provide mission findings that would be generally applicable to the existing preparedness and response system in the Region, the arrangements for dealing with two different types of situations warranting emergency preparedness were also examined:

- the ability of a facility in threat category I, II and III (note that the Region has many facilities falling into these threat categories) to respond. Facilities in these threat categories and nearby jurisdictions, in accordance with IAEA Requirements [1], must have robust emergency response arrangements that should be subject to the regulatory system. The emergency arrangements of several licensees were examined;
- the ability to respond to a radiological emergency (at conducting activities in threat category IV and V) that could occur anywhere in the Region. These arrangements include local emergency services having the basic ability to recognize a radiation emergency and to take appropriate immediate action, and the ability of regional and

federal officials to support local response organizations. The arrangements to respond locally, regionally and on federal level to a radiological emergency in the Region were examined.

Both types of reviews were used to benchmark emergency preparedness arrangements for these two different regulatory and operational environments, and generalized findings were subsequently developed.

The members of the mission team (see Appendix I) were selected on the basis of their relevant experience in the above-mentioned areas.

No visits to the facilities other than those listed in Section 1.3 and no other verification activities were foreseen during the mission. The collected data and analysis contained in this report rely on relevant documentation provided and interviews with representatives of key response organizations and on personal impressions obtained during the visits to different sites and institutions. The mission concentrated on those areas which the team viewed as crucial regarding the establishment of a solid emergency response capability.

1.3. PROCESS

The general schedule for the mission is shown in Table 1. The mission team visited the authorities and facilities in accordance with the schedule prepared by the representatives of the Archangelsk Region (based on the Terms of Reference) and conducted interviews and discussions. JSC "CS "Zvezdochka" in Severodvinsk were not accessible for the foreign members of the team (Mr. Janko, Mr. Zombori), this facility was assessed by the Russian member of the EPREV team (Mr. Kutkov). Notes were taken during the visits and consolidated during regular work meetings of the team members. All members of the mission met with representatives of JSC "CS "Zvezdochka" and JSC "PA "SEVMASH". Major findings and recommendations were entered into the extended assessment worksheet prepared for the mission's purposes.

Table 1. Mission Schedule

@	Date	Subject
A	**04 July**	**Arrival in Moscow.** Meeting in IBRAE RAN, Moscow. Briefing given by L.A. Bolshov, Director of IBRAE RAN, A.A. Sarkisov, Academician of the Russian Academy of Sciences, and technical experts at IBRAE RAN. **Travelling to Archangelsk.**
B	**05 July**	**Plenary meeting in the Government of Archangelsk Region, Archangelsk.** Briefing given by representatives of the Government of the Archangelsk Region, of Russian management of NDEP-008 Project, of radiation-hazardous facilities, regional structures of EMERCOM of Russia and of ROSHYDROMET (according to special program).
C	**06 July**	**Meeting at office of the NWB IBRAE RAN, Severodvinsk.** Conference with the representatives of JSC "CS "Zvezdochka", JSC «NIPTB Onega» and JSC "PA "SEVMASH".

D	**07 July**	**Meeting in Administration of Severodvinsk Municipality, Severodvinsk.** Conference with Administration of Severodvinsk at Severodvinsk Municipality the experts of Severodvinsk Municipality (police, civil defence and public health) and territorial organizations of FMBA.
E		**Meeting in Northern ROSHYDROMET, Archangelsk.** Conference with management and experts of the Northern Interregional Territorial Department for Hydrometeorology and Environment Monitoring (Northern DHEM) and the State Institution «Archangelsk Centre on Hydrometeorology and Environmental Monitoring with the Regional Functions» («Arkhangelsk CHEM-R») of ROSHYDROMET.
F	**08 July**	**Meeting with AMD EMERCOM of Russia, Archangelsk.** Conference with the representatives of relevant departments of the Government of the Archangelsk Region, AMD EMERCOM, ARSA "Centre to ensure activities of civil protection of the Archangelsk Region", ARSA "Rescue Service", Ministry of Interior.
G	**09-10 July**	Review of regulatory and administrative documents of Archangelsk regional government and Severodvinsk municipal government.
H	**11 July**	**Meeting with AMD EMERCOM, Archangelsk.** Conference with the representatives of ROSTECHNADZOR, AMB ROSPOTREBNADZOR, AMD EMERCOM, FSUE «Krylov CNII» and IBRAE RAN.
I	**12 July**	**Meeting with the Government of Archangelsk Region, Archangelsk.** Conference with the representatives of ROSATOM and the Government of the Archangelsk Region.
J	**13 July**	**Emergency exercises "Arctic 2011". Government of the Archangelsk Region, Archangelsk.** Observation of activity of Regional Crisis Centre of the Government of the Archangelsk Region.
K		**Emergency exercises "Arctic 2011". Site of JSC "CS "Zvezdochka", Severodvinsk.** Observation of activity of facility emergency teams JSC "CS "Zvezdochka" and Joint Local Crisis Centre of JSC "CS "Zvezdochka" and JSC «NIPTB Onega».
L	**14 July**	**Plenary meeting in the Government Building of the Archangelsk Region, Archangelsk.** Final meeting in the framework of NDEP-008 project "Enhancement of the System of Radiation Monitoring and Emergency Response in the Archangelsk Region" and the EPREV mission of the IAEA to the Archangelsk Region. Briefing of IAEA team, representatives of organizations involved in emergency preparedness and response, experts of EBRD and Government of the Archangelsk Region to discuss findings and addressing unresolved issues. **Departure.**

The major organizations with which the mission team interacted were:

1. Government of the Archangelsk Region – with overall responsibility for the radiation monitoring and protection of the population in the Region:

- Agency for Natural Resources and Ecology of the Archangelsk Region;
- Agency for State Fire Service and Civil Defence of the Archangelsk Region.

2. Ministry of Civil Defence, emergencies and disaster relief of the Russian Federation (EMERCOM of Russia), organizations responsible for prevention and liquidation of emergencies reported to the Government of the Archangelsk Region:
   - Archangelsk Main Department of EMERCOM (AMD EMERCOM) - organization, with overall responsibility for the protection of the public and territories in case of an emergency and for the prevention of emergencies. AMD EMERCOM is responsible for 24/7 monitoring of the basic safety parameters in the territory of the Region, coordination between the participants of the emergency response system, organization of emergency response using forces and assets of the federal level;
   - State Public Institution of the Archangelsk Region «Centre for ensuring civil protection activities»;
   - State budgetary institution of the Archangelsk Region «Rescue service»;
   - Archangelsk territorial Centre "Medicine of catastrophes" – regional organization of first-aid medical assistance for population;
3. Federal Service for Hydrometeorology and Environmental Monitoring of the Russian Federation (ROSHYDROMET):
   - Radiometric laboratory of the Environmental Monitoring Centre of the Main Department of the "Arkhangelsk CHEM-R", which is responsible for acquisition and processing of information from the Archangelsk Territorial ARMS;
   - Main Department of the "Arkhangelsk CHEM-R" and Northern DHEM of the Federal Service for Hydrometeorology and Environmental Monitoring (CHEM-R and Northern DHEM of ROSHYDROMET) that are responsible for provision of information on weather conditions in case of emergency threat or in case of emergency in the Region, forecast of radioactive material dispersion and transboundary transfer (in cooperation with SPA "Typhoon" of ROSHYDROMET;
4. Federal Medical and Biological Agency of the Russian Federation (FMBA):
   - Regional Medical and Sanitary Division No. 58 of FMBA – a federal organization for sanitary services and medical support of workers and the public in Severodvinsk in case of normal operation and in emergency;
5. Federal Service on Customers' Rights Protection and Human Well-being Surveillance (ROSPOTREBNADZOR):
   - Archangelsk Main Branch of ROSPOTREBNADZOR (AMB ROSPOTREBNADZOR) – a sanitary survey which is responsible for the control of human exposure in all the territory of Archangelsk Region excluding territories being under control of FMBA;
6. Ministry of Industry and Trade of the Russian Federation (MINPROMTORG):
   - Joint-Stock Company "Centre of Ship repairing "Zvezdochka" (JSC "CS "Zvezdochka") – the main enterprise in the Region engaged in Nuclear Power Submarine (NPS) repair, unloading of spent nuclear fuel, decommissioning, handling radioactive waste and operating a number of facilities where different activities involving sources of radiation are carried out;
   - Joint-Stock Company "Research and Development Technological Bureau "Onega" (JSC «NIPTB Onega») - the main enterprise in the Region engaged in development of design and organizational documentation for the repair and dismantling of NPS and surface nuclear-powered vessels, design and technological projects for RW and SNF management;
   - Joint Stock Company "Production Association "SEVMASH" (JSC "PA "SEVMASH") – the main enterprise in the Region engaged in NPS building, loading of nuclear fuel,

handling radioactive waste and the operation of approximately 25 facilities where different activities involving sources of radiation are carried out;
   - Federal State Unitary Enterprise "Krylov Shipbuilding Research Institute" (FSUE «Krylov CNII») - research institute responsible for support of MINPROMTORG' enterprises (JSC "CS "Zvezdochka", JSC «NIPTB Onega», JSC "PA "SEVMASH") in developing capabilities for response to radiation emergencies;
7. Administration of Severodvinsk – city of Archangelsk Region where JSC "CS "Zvezdochka", JSC «NIPTB Onega» and JSC "PA "SEVMASH" are located.
8. Nuclear Safety Institute of Russian Academy of Sciences (IBRAE RAN):
   - Energy Safety Analysis Centre of IBRAE RAN (ESAC IBRAE RAN) — the general Contractor on the project NDEP-008;
   - Technical Crisis Centre (TCC) of IBRAE RAN - technical support organization for the Government of the Archangelsk Region;
   - Northwest branch of IBRAE RAN (NWB IBRAE RAN)

The total list of work done and persons met is given in Appendix II.

1.4. INPUT AND GUIDANCE FOR THE ASSESSMENT

The mission was conducted in accordance with the **Terms of Reference (ToR)** (see Appendix III).

An important input for the assessment of the country's radiological emergency preparedness and response capabilities was provided by the **self–assessment questionnaires** containing the evaluation prepared by Mr. Boris Petrov (FSUE "Emergency Technical Centre of Minatom of Russia", Saint Petersburg), in preparation for the Regional Coordination Meeting of the regional TC project RER9100 in April 2011.

A set of documents (federal and regional decrees, regulations, procedures, presentation materials etc.) was sent by IBRAE RAN and made available for the EPREV team members prior to the mission.

The EBRD provided important documents regarding the NDEP-008 project objectives and technical specification.

The assessment was mainly based on visits to different organizations participating in the regional nuclear and radiological emergency response system and on interviews with official representatives of these organizations.

1.5. REGIONAL TABLE-TOP AND FIELD RADIOLOGICAL EMERGENCY EXERCISE

After initial negotiations, the dates of the mission were determined in order to make it possible for the team to observe a regional exercise, designed to test regional emergency response capabilities, with special regard to newly established infrastructural elements (the established automatic radiation monitoring system, mobile laboratories, crisis and situation centres, communication systems, specialized software and system of technical support for decision making). This exercise was carried out on 13 July 2011 with the participation of all regional and federal agencies and organizations having a role in nuclear and radiological emergency response. A short summary of the exercise is given in Appendix IV.

2. SUMMARY OF FINDINGS

2.1. HISTORICAL BACKGROUND AND PRESENT SITUATION

2.1.1. Archangelsk Region

The Archangelsk Region (Oblast) is a federal subject of Russia (an Oblast). It includes the Arctic archipelagos of Franz Josef Land and Novaya Zemlya, as well as the Solovetsky Islands in the White Sea. The Archangelsk Region is located in the North of the European part of Russia. Its coast line has a length of 3000 km and is surrounded by three Arctic seas: the White, Barents and Kara Seas.

Figure 1. Location of Archangelsk Region in the Russian Federation. 1 - Moscow, 2 - St. Petersburg, 3 - Archangelsk

The Archangelsk Region also has administrative jurisdiction over Nenets Autonomous Okrug ("Nenetsia"). Including Nenetsia, the Archangelsk Region has an area of 587,400 km². The total population (including Nenetsia) is: 1,228,100 (2010), with approximately 1 million living in urban settlements.

The Region is administratively subdivided into:

- Six cities and towns under the Region's jurisdiction:
  - Archangelsk, population 348,700 (2010 Census);
  - Koryazhma, population 42,460 (2010 est.);
  - Kotlas, population 60,647 (2002 Census);
  - Novodvinsk, population 43,383 (2002 Census);
  - Onega, population 23,430 (2002 Census); and
  - Severodvinsk, population 192,300 (2010 Census).

- One city under the federal jurisdiction - Closed Administrative and Territorial Formation Mirny serving the Plesetsk Cosmodrome. Population: 26,819 (2010);
- Twenty-one districts (one of which is Novaya Zemlya); and
- Two island territories (Franz Joseph Land and Victoria Island).

Another six settlements with the status of a town — Kargopol, Mezen, Nyandoma, Shenkursk, Solvychegodsk, and Velsk — are part of the corresponding districts.

The Nenets Autonomous Okrug, which is a part of the Region, is administratively divided into a district (Zapolyarny District) and the town of Okrug significance (Naryan-Mar).

Among the oldest cities of the region are Kholmogory, Kargopol, and Solvychegodsk; there are a number of Russian Orthodox monasteries, including the Antoniev Siysky Monastery and the World Heritage Site of the Solovetsky Islands in the White Sea.

The average population density is 2.2 people per km^2. The population living in urban settlements is 74.7% and 25.3% in rural ones.

The territory of the Archangelsk Region is a vast plane slightly sloping towards the White Sea and the Barents Sea, where the planes are broken with hills, which were formed by ancient glaciers.

Large areas of surface waters and marshes are typical of these lands. Excess water retains in closed cavities, soaks the soils and runs into the sea via the many rivers. The large river valleys were formed before the ice age, and today the rivers of the Region, including Severnaya Dvina (774 km), Pinega (779 km), Vychegda (1130 km), Mezen (966 km) — are flowing towards the sea through developed valleys. Archangelsk Region has many lakes. Most of these are located to the west of Onega (Latcha, Kenozero, Kozhozero). Mostly they are located in groups near moraine mounds. Such lakes usually do not influence the rivers much. Another common feature are karst lakes with variable water levels.

Annual precipitation in the forest area ranges from 400 to 540 mm, with 200 days per year bringing precipitation. Precipitation falls as week-long snowfalls in the winter and long-term drizzle rains in the autumn. The relatively high humidity is caused in winter and autumn (85–95%) and in summer and spring (70–90%) by masses of warm air, and depends on vaporization over the melting snow, surface waters, forests and marshes and the conditions of prolonged cloudy weather and low temperatures. A thick snow cover reaching 60–70 cm is formed in the territory of the region in the winter. The snow falls between October 25 and November 10, and the cover melts until April 25–May 10 (the snow may remain on the White Sea coast until May 20).

For more information please see the official internet portal http://www.dvinaland.ru/

2.1.2. City of Archangelsk

Archangelsk is a city and the administrative centre of Arkhangelsk Region, Russia. It lies on both banks of the Northern Dvina River near its exit into the White Sea in the far north of European Russia. The city is spread over 40 kilometres along the banks of the river and numerous islands of its delta. Arkhangelsk was the chief seaport of medieval Russia. It is served

by Talagi Airport and the smaller Vaskovo Airport. The city is located at the end of a 1,133 km long railroad, connecting it to Moscow via Vologda and Yaroslavl.

For more information please see the official internet portal http://www.arhcity.ru/

2.1.3. City of Severodvinsk

The city of Severodvinsk is located on the mouth of the Severnaya Dvina river, 35 kilometers from Archangelsk. This city is a centre of Severodvinsk municipally. Most of the population of Severodvinsk are employed at the major industrial facilities of the ship-building industry, Joint Stock Company (JSC) "Centre of Shipbuilding "Zvezdochka" (JSC "CS "Zvezdochka"), JSC "Research and Development Technological Bureau "Onega" (JSC «NIPTB Onega») and JSC "Product Association "SEVMASH" (JSC "PA "SEVMASH"). These facilities are of federal jurisdiction and operate under the charge of the Ministry of Industry and Trade of the Russian Federation (MINPROMTORG).

For more information please see the official internet portal http://www.severodvinsk.info/

2.1.4. JSC "Centre of Shiprepairing "Zvezdochka"

The Joint-Stock Company "Centre of Ship repairing "Zvezdochka" (JSC "CS "Zvezdochka") was founded by the Decree of USSR Council of Ministries in 1946 in Nikolskoye Mouth of the Severnaya Dvina River on the Yagry Island. The facility was initially designed and constructed for refitting naval ships. Its operation began in 1954. Today, JSC "CS "Zvezdochka" is a multi-functional industrial facility.

The facility is located in the town of Severodvinsk on the Yagry Island 35 km to the west of Archangelsk in the delta of Severnaya Dvina river.

The main activities of the facility include:

- Repair and modernization of diesel and nuclear submarines, surface naval ships;
- Civil ship repair and building;
- Comprehensive decommissioning of NPS and nuclear-powered surface ships withdrawn from the lists of the navy;
- Production of ship propellers;
- International military and technical cooperation.

One of the main activities at JSC "CS "Zvezdochka" is the comprehensive decommissioning of the nuclear submarines withdrawn from the lists of the Russian Navy. Modern infrastructure was constructed at JSC "CS "Zvezdochka" for decommissioning of nuclear-powered ships, as well as processing of the radioactive waste.

The capacity of the facility allows:

- Decommissioning of up to 8 NPS per year;
- performing 4–6 operations for unloading of spent fuel from the reactors of decommissioned NPS annually;
- carrying out management and temporary storage of SNF;
- carrying out management, temporary storage and reprocessing of liquid and solid RW.

The NPS decommissioning infrastructure of JSC "CS "Zvezdochka" includes the following main utilities:

- coastal facility for spent nuclear fuel unloading;
- temporary storage facility for transport containers loaded with SNF;
- utility for temporary storage and reprocessing (conditioning) of liquid and solid RW;
- section for slipway works, which includes a dry and floating dock;
- specialized section for mechanical cutting of scrap metal;
- specialized section for gas cutting of scrap metal;
- special section for electric cable reprocessing.

For the significant contribution in the creation and production of new techniques and successful implementation of tasks in the five-year plans, the enterprise was rewarded with the LENIN ORDER - USSR Supreme Council Presidium Decree from 18 January 1971 – for successfully carrying-out the task of the Government regarding repair and modernization of the world's first nuclear-powered icebreaker "Lenin" with the replacement of the nuclear power unit by a new, more sophisticated and powerful one.

The JSC “CS “Zvezdochka” has a number of radiation facilities in use and is characterized as a Danger Category 1 object as defined by Ref [5]. The JSC “CS “Zvezdochka” has to be assessed as a facility of Threat category I as required by [1]. For more information please see the official internet portal http://www.star.ru/.

2.1.5. JSC "Research and Development Technological Bureau "Onega"

The Onega Research and Development Technological Bureau was founded in 1975 by the Order of the MinSudProm (USSR) and it was the Federal State Unitary Enterprise until 2008. Following the RF President’s Decree No. 394 dated March 21, 2007, it became the Joint Stock Company Onega R&D Technological Bureau (JSC «NIPTB Onega»). At present, the company is one of the leading research organizations in the Russian shipbuilding industry.

Trends of activity:

- Research activity – carrying out operations in the framework of the “Nuclear and Radiation Safety from 2008 until 2015”, “National Processing Base of Russia” Federal Task-Oriented Programs and others;
- Repair and life cycle extension – design and technological support of nuclear powered submarines and ships, diesel electric submarines;
- Nuclear powered submarines and ships dismantling, nuclear/radiation hazardous facilities remediation, and radioactive waste and spent nuclear fuel management – design and technological support of nuclear powered submarines and ships dismantling and nuclear/radiation hazardous facilities remediation, and radioactive waste and spent nuclear fuel management;
- Military and technical cooperation – development of documents concerning the overhaul of ships constructed in Russia and delivered abroad;
- Oil and gas complex – design and technological support of oil and gas on-shore deposits;
- Ship furniture – development of design documents for ship furniture.

JSC «NIPTB Onega» has the certificate of its state accreditation as a scientific institution.

One of the important activities of JSC «NIPTB Onega» is the development of documents for liquid RW and solid RW storage and treatment. Developed technical-organizational, procedural and design documentation is intended for nuclear and radioactive safety in nuclear powered ship

decommissioning and overhaul. The spent nuclear fuel unloading process is carried out in accordance with JSC «NIPTB Onega»'s technologies.

Another important activity of JSC «NIPTB Onega» is the development of the Safety Assessment Report for, and threat assessment of, nuclear hazardous facilities, which are constructed, repaired or decommissioned under its supervision.

The JSC «NIPTB Onega» does not have radiation facilities in use and is not characterized as a dangerous facility. For more information please see the official internet portal http://onegastar.ru/.

2.1.6. JSC "Product Association "SEVMASH"

The Joint Stock Company "Production Association "Northern machine – building enterprise" (JSC "PA "SEVMASH") is the largest ship-building complex in Russia. The JSC "PA "SEVMASH" is the only shipyard of the country building nuclear submarines for the Russian navy. The enterprise, occupyingan area of more than 300 hectares, includes in its structure more than 100 subdivisions. More than 25,000 people work on the basic enterprise site in Severodvinsk.

The basic directions of activity include:

- military engineering manufacturing for the Russian navy and foreign customers;
- marine engineering manufacturing for oil and gas production;
- civil shipbuilding;
- manufacturing of equipment for mechanical-engineering, metallurgy, gas-and-oil and other branches of industry;
- nuclear submarines and surface ships warranty repair and upgrading, utilizing;
- design of vessels, marine structures, marine equipment, equipment for oil and gas production.

To date, 128 nuclear submarines have been built by JSC "PA "SEVMASH". At present, atomic submarines of a new generation are built at the enterprise. The factory's tests of the head ship of the project 955 – "Yuri Dolgoruky" are complete. The next ship of this series – the NPS "Aleksander Nevsky" – produced from the workshop on 1 December 2010. The factory tests of the NPS include:

- upload of nuclear fuel;
- commissioning of nuclear submarines, including:
  - cold and hot tests of nuclear unit,
  - sea trials of nuclear submarines.

In total, more than 200 reactor units were commissioned at JSC "PA "SEVMASH".

The machine-builders of JSC "PA "SEVMASH" are manufacturing high-tech products for the nuclear industry – the transport-packing containers for spent fuel of submarines, ice-breakers and Nuclear Power Plants (NPP).

For the significant contribution to the creation and production of new techniques, successful carrying-out of tasks and five-year plans, the enterprise was rewarded with five USSR orders:

1. LENIN ORDER - USSR Supreme Council Presidium Decree from 23 July 1959 – for successfully implementing the task of the Government regarding special technique creation (creation of the first nuclear submarine of 627 project, later named: "Leninsky

Komsomol") and also the contribution made by the enterprise to native shipbuilding development.

2. ORDER OF LABOUR RED BANNER - USSR Supreme Council Presidium Decree from 28 April 1963 – for the significant contribution to the creation and production of a new type of missile armament, as well as nuclear submarines and surface ships, equipped with weapons and naval forces ship rearmament.
3. OCTOBER REVOLUTION ORDER - USSR Supreme Council Presidium Decree from 18 January 1971 – for successfully carrying-out the 8th five-year plan (1966-1970 years) and the organization of a new production technique.
4. LENIN ORDER - USSR Supreme Council Presidium Decree from 24 February 1976 - for successfully carrying-out the 9th five-year plan (1971-1975 years) regarding special technique output, new shipbuilding complex productive capacities introduction, achievement of high rates in production effectiveness and work quality improvement.
5. LENIN ORDER - USSR Supreme Council Presidium Decree from 2 February 1984 – for the significant contribution to a new technique creation, testing and production development (creation of third generation strategic nuclear submarines of 941 "Akula" project).

The JSC ”PA “SEVMASH” has approximately 25 radiation facilities in use and is characterized as a Danger Category 1 as defined by Ref [5]. The JSC ”PA “SEVMASH” has to be assessed as a facility of Threat category I as required by [1]. For more information please see the official internet portal http://www.sevmash.ru/.

2.2. MAIN FINDINGS

The legal framework and the system of responsibilities stem from the constitution. The Constitution of the Russian Federation (RF) [6] establishes the federal structure of the country as defined in Chapter 3 (see also Annex 1 for details). The Archangelsk Region is one of 83 federal subjects comprised by the RF. (Article 65 of the Constitution of the RF). The jurisdiction of the RF and federal subjects are separated. The jurisdiction of the RF includes, among others, *nuclear power-engineering, fission materials* (Article 71, point *i*), *Defence and security; military production* (Article 71, point *l*), meteorological service, standards (Article 71, point *p*). The joint jurisdiction of the RF and the regions includes, among others, *carrying out measures against catastrophes, natural calamities, epidemics, elimination of their aftermath* (Article 72, point *h*). Outside the limits of authority of the RF and the powers of the RF on issues under joint jurisdiction of the RF and the federal subjects, the federal subjects of the RF shall possess full State power (Article 73).

The following documents are the basic federal regulatory decrees regulating the safe use of nuclear power, radiation safety of the population, and organization of the system for prevention and mitigation/liquidation of emergency situations:

1. Federal Law No. 170 of 21st of November, 1995, “On the use of nuclear energy” [8] defines the legal basis and regulatory principles of the relations within the activity related to the use of nuclear power. The articles of the Law are related to a wide circle of issues of nuclear power application. In particular, the Law regulates the rules for location and construction of nuclear installations, and defines the legal status of organizations in the field of nuclear energy use. The Law declares that the citizens have the right to freely obtain information on the radiation situation. The Law regulates the order of compensation in case of any loss and harm as a result of radiation exposure due to activities related to nuclear energy use;

2. Federal Law No. 3 of 9th of January, 1996, "On the radiation safety of the population" [30] regulates the legal basis of radiation safety of the population in order to protect the population's health. The Law establishes a list of measures to provide radiation safety, separating the mandates of the RF and the subjects of the RF in the field of radiation safety provision. The Law defines the basic hygienic norms (permissible dose limits) of exposure in the territory of the RF as a result of ionizing radiation sources use. The Law defines measures to provide radiation safety at the natural radionuclide exposure, at food staff production and potable water consumption, and at radiographic medical procedures. The norms for radiation safety provision in a radiation emergency are also set. The right of citizens for radiation safety provision and obtaining of real information on radiation situation is declared;

3. Federal Law No. 68 of 21st December 1994 "On the protection of the population and territories in natural and technogenic emergency situations" [6] defines the RF organizational and legal norms in the field of protection of the RF citizens, foreign citizens and stateless persons living in the territory of the Russian Federation, the entire land, water and air space within the boundaries of the Russian Federation or its part, industrial or social facilities as well as environment from the natural and technogenic emergency situations;

4. RF Government order No. 794 of 30th December, 2003, "On the unified state system of prevention and liquidation of emergency situations" [9] defines the order of organization and functioning of unified state system of prevention and liquidation of emergency situations. The unified system combines the management bodies, forces and assets of the federal and regional executive authorities, local authorities and organizations, which are responsible for the protection of the population and territories from emergency situations.

Based on the experience gathered, documents received, visits and interviews conducted, the team drew the following general conclusions regarding the status of nuclear and radiological emergency preparedness in the Region:

Positive findings, good practices:

- The RF is one of the most experienced countries in the world in using nuclear and radiation technology for peaceful, as well as for military purposes. It has a solid legal, scientific and technological basis and background of pursuing these practices. It also has many decades experience regarding the establishment and operation of nuclear reactors and radioactive sources, with competence in the field of safety enhancement and emergency response. The overall legal framework of the RF guarantees that the relevant requirements and responsibilities are clearly defined. The institutional infrastructure in the country also provides a firm basis to respond successfully to any technological challenge that the nuclear applications may pose (e.g. waste management, emergency response operations, risk and consequences assessment etc.).
- The local government is fully aware of the special safety issues and concerns of the Region. Evidence of commitments to nuclear and radiological safety and maintaining a high level of emergency preparedness was received from the highest level of the local administration.
- Facility response plans, procedures, resources (manpower and infrastructure elements) are in place.
- The on-site and off-site organizations are committed and trained.

- A good level of competence regarding professional staff was experienced by the EPREV team during discussions with the various institutions.
- Despite the complexity of responsibilities, there seems to be good coordination and cooperation between the enterprises, the municipality, the federal response organizations and the emergency response system of the regional government. There is a good working relationship with the navy as well.
- A 3-level radiation monitoring system is in place: technological (on-site), local (municipal) and regional. This system has been enhanced by the NDEP-008 project.
- The NDEP-008 project has a remarkable impact on the level of preparedness for emergency response. All new elements seem to function: Automatic Radiation Monitoring System (ARMS), data exchange, video conferencing, mobile labs, remote expert assistance, etc. No complaint has been registered from the end-users, the system was fully functional and very impressive during the emergency exercise. The new system can be a model for other, similar, project upgrades.
- The emergency exercise showed that the Commission for prevention and mitigation of emergency situations and fire safety of the Archangelsk Region (CESF-AR) is well established and directed, its members are committed and competent in the field of activities they perform.

Issues of concern:

- The Region – due to its heavy involvement in nuclear applications and the abundance of fissile and radioactive materials, including fresh and spent nuclear fuel - is one of the most potentially hazardous places of the country. This special situation justifies particular attention regarding emergency preparedness and response.
- There is a separation of mandates and responsibilities between federal and federal subject's authorities in the control of practices and protection of the public, workers, and the environment in case of a nuclear or radiological emergency. This separation is defined by the Constitution of the Russian Federation [7] and the Federal Law on the Use of Atomic Energy [8]. For example:
  - *Radiation sources used for medical, industrial, research, and education are under the control of regional authorities;*
  - *Decommissioning reactors of nuclear submarines and ships are under federal responsibility and control (with no access by the regional government);*
  - *Operating and repairing reactors of submarines and ships are under federal responsibility and control (with no access by the regional government);*
  - *Protection of the public and the environment is under the regional responsibility.*
- National organization and structure of the emergency preparedness and response arrangements and capabilities is based on the "all hazard concept" and regulated by the Federal Law on Protection of the Public and Territories against Emergencies of Natural and Technogenic Origin [6] and the corresponding governmental decree [9]. Due to the complex and complicated control system, the emergency preparedness and response system is structured: federal authorities, local (regional) governmental agencies, the enterprises and the municipalities all have their own organizations to be activated in case of a nuclear or radiological emergency:
  - The Ministry of Civil Defence, Emergencies and Disaster Relief of the Russian Federation (EMERCOM) is coordinating preparedness and response in case of emergencies involving radiation sources (facilities) under any jurisdiction. Regional response organizations support on-site response. Response organizations of EMERCOM support response at the regional level.

- Each radiation facility is responsible for the protection (at facility level) of its workers at its site and inside the Sanitary Protection Zone (SPZ)[1]. The facility has special emergency response teams as an element in the civil defence organization for the implementation of protective actions at the site and in the SPZ. Special regional agencies of Federal Medical and Biological Agency of the Russian Federation (FMBA) and fire protection divisions of EMERCOM support the on-site response at radiation facilities of federal jurisdiction;
- Local authorities are responsible for the protection (at municipal level) of citizens of municipalities, workers and the environment outside the SPZ of the radiation facility. Municipalities have special emergency response teams as an element of the municipal civil defence organization for the implementation of protective actions outside the SPZ;
- Regional authorities are responsible for the protection (at "oblast" or regional level) of citizens of municipalities and the environment outside the emergency municipality. Regional authorities can use municipal response organizations and also have special emergency response teams as an element of the regional civil defence organization for the implementation of protective actions in the Region;
- Regional branches of federal agencies, e.g., FMBA, EMERCOM, Federal Service for Hydrometeorology and Environmental Monitoring of the Russian Federation (ROSHYDROMET), Federal Environmental, Industrial and Nuclear Supervision Service of the Russian Federation (ROSTECHNADZOR) and Federal Service on Customers' Rights Protection and Human Well-being Surveillance of the Russian Federation (ROSPOTREBNADZOR) support emergency preparedness and response at regional level.

– Based on the observation of the emergency exercise and related discussions, there are no clearly defined facility specific Operational Intervention Levels (OILs), required by the international standards [1, 10] that would be the basis for speedy decisions in an emergency situation.
– The dose guidance levels applied for emergency workers [11] does not comply with international recommendations and are much lower than those established in the GSG-2 [10].
– The EPREV team could not get a clear answer to questions such as: what procedure is to be followed in case of an accident with a ship/submarine cruising somewhere along the coast, whether it is treated as a category I or category IV threat, who is responsible for protection of the public and how etc.
– With the implementation of the NDEP-008 project, a multitude of prognostic calculations and consequence analyses conducted by federal organizations (CHEM-R, IBRAE RAN, Typhoon etc.) became available. This may lead to redundant information and advice, possibly overlapping or even contradicting, from different organizations involved in the assessment. No clear procedure on how to evaluate and consolidate these assessments was demonstrated during the discussions and the exercise.
– The emergency exercise held during the mission was well designed and successfully implemented. Its greatest achievement was the demonstration of the new functions of the upgraded IT system. However, it did not reveal much about the decision making process, and only tested different capabilities in line with pre-defined, unchangeable scenario.

[1] Safety requirements to the Sanitary Protective Zone of a radiation facility are formulated by the corresponding regulations [5, 12]. In relation to radiation emergency preparedness and response this zone is similar to "low population zone" defined in the relevant U.S. NRC regulation. The difference is that residing in SPZ is forbidden.

The mission team formulated recommendations and suggestions based on the findings. The recommendations need to be addressed in order to reach compliance with the IAEA Requirements [1]. To help implement the recommendations, the mission team has issued recommendations for ways of meeting the IAEA Requirements or for other good practices.

The summary findings are divided into two groups:

- **Interim** findings that can and should be addressed immediately, through interim (immediate) actions, using existing capabilities, to significantly improve response capabilities. These findings should be addressed within one year.
- Findings pertaining to national/regional/local response organization/coordination, which should be addressed through **longer term actions**.

2.3. INTERIM (IMMEDIATE) ACTIONS

1. Formal agreement concerning emergency initiation and notification, and exchange of information during an emergency should be developed between the Archangelsk government, federal authorities which have jurisdiction over nuclear and radiation facilities in the Region, and technical supporting organizations.
2. The prioritization and use of redundant assessment results should be developed as part of the preparedness efforts (and not during an emergency).
3. It is suggested that the AMD EMERCOM investigate the possibility of using some of the functions and tools of the newly established IT system (e.g. video conferencing) for the management of responses to other types of emergencies. This may require the extension of the system to include (modularly) signal processing from other monitoring systems (e.g. fire monitoring).
4. It is recommended to establish training courses for the mass media to build public awareness and better understanding of radiation protection issues and to develop plain language explanations for the public.
5. The road conditions may be crucial in case of an emergency at JSC “CS “Zvezdochka”. If there is a need to provide assistance to the facility or to evacuate the population from Yagry district of Severodvinsk, such problems (the only one and low quality narrow road) may prevent a successful response. These issues should be carefully considered and road conditions should be improved.

2.4. LONG-TERM ACTIONS

1. Facility specific OILs should be developed and made known to all responding organizations.
2. The dose guidance levels for the emergency workers should be harmonized with the international recommendations.
3. To enhance capabilities for first response to a radiological emergency, a local system of professional training for all responding parties should be established. The materials of the IAEA Workshops on First Response to a Radiological Emergency (in Russian) based on the IAEA Manual for First Responders to a Radiological Emergency [4], can be a good basis for conducting these courses.
4. More exercises should be conducted to improve familiarity with the new, upgraded emergency management support system and to exercise the decision-making process. The exercises should be focused on solving problems occurring during the response and

on decision-making rather than only on demonstrating the capabilities of parties involved in off-site or on-site response.

3. DETAILED FINDINGS

The mission team's detailed evaluation of the regional emergency preparedness and response system is based on the information provided by the local and federal Government officials, concerned facility managers and representatives that the mission team interviewed.

Due to the time constraint of finalizing the mission within ten days, it was not possible to verify all the information provided.

Consequently, information provided by the officials from the different response organizations may not be fully consistent. This is, in part, due to the fact that the nuclear and radiological emergency preparedness and response arrangements are currently being upgraded and, in some cases, the information may reflect intentions rather than existing conditions, and contradictions are certainly more due to these transitional conditions.

Where appropriate, the EPREV team listed interim findings indicating actions that should be taken immediately, using existing capabilities, to strengthen the emergency preparedness and response program in the Archangelsk region. Following these, findings for longer term implementation are listed pertaining to actions providing a solid foundation for an emergency preparedness and response program consistent with the IAEA Requirements [1].

The following sections address the main issues of the IAEA Requirements [1] concerning the basic responsibilities, assessment of threats, response functions and infrastructure.

3.1. BASIC RESPONSIBILITIES

Regarding the requirements set out in [1] for basic responsibilities, the following appraisal criteria were investigated:

- Establish or identify an existing governmental body or organization to act as a national coordinating authority;
- Clearly assign the functions and responsibilities of users and response organizations and ensure they are understood by all response organizations;
- Establish a regulatory and inspection system that provides reasonable assurance that emergency preparedness and response arrangements are in place for all facilities and practices.

3.1.1. Current situation

Regarding national and regional coordination:
The Russian Unified State System for Prevention and Liquidation of Emergency Situations (RSES) regulates all relations between the government, non-governmental organizations and the civilian and military organizations in the framework of protection of the public and territories against emergencies of natural and technogenic origin. It is acting under the federal law FZ-68/1994 [6]. The structure of the system is defined by the governmental decree [9]. The RSES includes a number of functional sub-systems which are defined by [9]. The RSES contains the following levels:

Federal level:

- Governmental Commission for Prevention and Liquidation of Emergency Situations and Fire Safety. The Governmental Commission consists of representatives of the Federal

Ministries, Agencies and Departments in rank of Deputy Minister (Head). The main operational body of RSES is the EMERCOM of Russia.

- Ministerial Commissions for Emergency Management. The Ministerial Commission is organised in the federal agency (ministry) to manage on-site emergency preparedness and response at subordinate enterprises or to support other actions at federal level of the RSES:
  - The State Atomic Energy Corporation "Rosatom" (ROSATOM) is mandated as a Competent Authority in the use of atomic energy [8, 13]. The Federal State Unitary Enterprise "Situation Crisis Centre of ROSATOM" (SCC ROSATOM) acts as the contact point for international cooperation to include the international Notification and Assistance Conventions [14]. ROSATOM is responsible for the coordination of preparedness and response to nuclear and radiological emergencies in the transport of radioactive material, including fresh and spent nuclear fuel, and at facilities of ROSATOM's jurisdiction.
  - The Ministry of Industry and Trade of the Russian Federation (MINPROMTORG) is the governmental body responsible for on-site emergency preparedness and response at facilities of MINPROMTORG's jurisdiction, including JSC "CS "Zvezdochka", JSC «NIPTB Onega», and JSC "PA "SEVMASH".

Inter-regional Level (territory of federal district, which includes several regions of the federation): Apparatus of the authorized representative of the President of the Russian Federation in the federal district.

Regional level (territory of the country's federative region): Commission for Prevention and Liquidation of Emergency Situations and Fire Safety of the executive authority of the subject of the Russian Federation (the Region), headed by the head of the subject of the RF. The regional department of EMERCOM plays the role of the Regional Coordination and Inspection Authority. In the Archangelsk Region this is the Archangelsk Main Department of EMERCOM (AMD EMERCOM).

Municipal level: Commission for the Prevention and Liquidation of Emergency Situations and Fire Safety of the administrations of municipalities, headed by the head of the municipality.

On-site level (facility): Commission for the Prevention and Liquidation of Emergency Situations and Fire Safety of the facility, headed by the director of the facility.

Regarding the assignment of responsibilities:

1. The **operator** is responsible for on-site response including personnel protection.
2. The **local authorities** are responsible for urgent protective measures for the population.

The operator shall notify the local authorities in case of an actual radioactive release. The operators and the local authorities have coordinated emergency response plans. Each facility being under the federal jurisdiction should have its own certified site emergency response team (this is a mandatory condition of license). There is also a possibility to call for professional emergency rescue teams of the State Corporation "Rosatom" and other Agencies within the established inter-agency interaction. ROSATOM's regional emergency response units are responsible for transportation accidents and for the provision of assistance to operators and local authorities.

In the Region, the coordination of interaction, the Commission's decision implementation and oversight is carried out by the Department of the Federal Ministry of Emergency Situation (EMERCOM). The Archangelsk Main Department of EMERCOM (AMD EMERCOM) provides fire fighting and rescue services. It coordinates and cooperates with other federal institutions, like ROSHYDROMET, "Medicine of Catastrophe", forensic teams and a special medical branch and sanitary service of the Federal Ministry of Health. The AMD EMERCOM operates the State Agency "Crisis Situation Management Centre" (CSMC AMD EMERCOM) which is a 24/7 contact point, exchange of information, evaluation of the situation in preparation of decision making in the event of any emergency. The AMD EMERCOM has the responsibility and necessary infrastructure for the provision of prompt information and instruction to the public. The new information centre and the other infrastructural elements installed under the NDEP-008 project serve this purpose. The decision making body (at the regional level) is the Commission for the Prevention and Liquidation of Emergency Situations and Fire Safety of the Archangelsk Region.

Regarding the regulatory and inspection system:

State regulation of atomic energy safety use: is conducted by the following authorities:

1. Federal Service for Ecological, Technological and Atomic Supervision (ROSTECHNADZOR);
2. Ministry of Health and Social Development of the Russian Federation
   - Federal Service on Customers' Rights Protection and Human Well-being Surveillance of the Russian Federation (ROSPOTREBNADZOR);
   - Federal Service on Customers' Rights Protection and Human Well-being Surveillance of the Russian Federation (FMBA);
3. Ministry of Civil Defence, Emergencies and Disaster Relief of the Russian Federation (EMERCOM of Russia).

Federal law No. FZ-68/1994 [6], regulating the operation of EMERCOM and current arrangements existing at the regional level in Archangelsk region guarantees that the requirements of GS-R-2 [1] are fully met.

3.2. ASSESSMENT OF THREATS

Regarding the requirements set out in GS-R-2 for threat assessment, the following appraisal criterion was investigated:

- Perform threat assessments for the facilities and activities in the State, categorize them in accordance with the five threat categories in Table I of GS-R-2.

3.2.1. Current situation

Russian regulation "Basic Sanitary Rules for Ensuring Radiation Safety" (OSPORB-99/2010) [5] establishes the classification of nuclear and radiation facilities based on the level of their radiation danger. This categorization is the basis for construction of new facilities and for emergency preparedness at existing facilities.

TABLE 2. RELATION BETWEEN DANGER CATEGORIES AND THREAT CATEGORIES OF FACILITIES

	Category				
Danger category of OSPORB-99/2010 [5]	1		2	3	4
Threat category of GS-R-2 [1]	I	II	III		

OSPORB-99/2010 is a facility oriented regulation and provides qualitative definition of the Danger category of a radiation facility. The relationship between Danger categories for facilities in the RF and Threat categories of facilities defined by the IAEA in GR-R-2 [1] is given in Table 2. Quantitative criteria for the categorization of radiation facilities in the RF are provided by methodological guidelines MU 2.6.1.2005-05 [15]:

Category 1. Facilities, such as nuclear power plants or research reactors, for which on-site maximal accident is postulated that outside the Sanitary Protection Zone of the facility, it could give rise to dose of potential exposure of the public exceeding dose limit of 1 mSv and warrant implementation of protective actions off-site.

Category 2. Facilities other than facilities from Category 1, for which on-site maximal accident is postulated that at territories of the Sanitary Protection Zone of the facility which are allowed to access the corresponding categories of workers and the public, it could give rise to:

- dose of potential exposure of the public exceeding dose limit of 1 mSv, or
- dose of potential exposure of the workers from group B exceeding dose limit of 5 mSv, or
- dose of potential exposure of the workers from group A exceeding dose limit of 20 mSv.

Category 3. Facilities other than facilities from Category 1 and 2, for which on-site maximal accident is postulated that at territories of the facility site which are allowed to access the corresponding categories of workers and public, it could give rise to:

- dose of potential exposure of the public exceeding dose limit of 1 mSv, or
- dose of potential exposure of the workers from group B exceeding dose limit of 5 mSv, or
- dose of potential exposure of the workers from group A exceeding dose limit of 20 mSv.

Category 4. Facilities other than facilities from Category 1, 2 and 3.

OSPORB-99/2010 does not categorize activities which could give rise to a nuclear or radiological emergency that would warrant urgent protective action in an unforeseeable location (threat category IV of GS-R-2). Activities not normally involving sources of ionizing radiation, but which yield products with a significant likelihood of becoming contaminated as a result of events at other threat facilities (Threat category V of GS-R-2) are also not categorized. Paragraph 7.7 of Radiation Safety Norms of the Russian Federation NRB-99/2009 (NRB-99/2009) [11] states that local authorities, together with supervisory organs, are responsible for the protection of the public in case of any emergency situation. This is not fully compatible with GS-R-2, so this criterion is only partially met.

A categorization of sources exists, but it is not fully in compliance with the threat categorization in GS-R-2 (the IAEA standards). This is the basis for emergency planning. In this system there is no category that would be equivalent to categories IV and V. For these cases, no special planning exists. There is some planning for specific issues (e.g. emergency on a ship or during transportation of SNF), but there are gaps in the system of planning.

3.2.2. Recommendation

1. It is recommended that the RF reviews and revises the threat categorization system to harmonize assessment criteria for category I, II and III with the assessment criteria from GS-R-2

and to include proper planning for IV and V threat categories at the level of the local authorities. The introduction of a graded approach in threat categorization including IV and V, harmonization with GS-R-2 and implementation in planning is recommended.

2. Conditions for emergency preparedness for mobile nuclear facilities that have a possible off site impact should be considered and targeted by plans of the concerned regions.

3.3. ESTABLISHING EMERGENCY MANAGEMENT AND OPERATIONS; AUTHORITY, ORGANIZATION AND COORDINATION OF EMERGENCY RESPONSE

Regarding the requirements set out in [1] for establishing emergency management and operations, the following appraisal criterion was investigated:

- Make arrangements to coordinate the emergency response of all off-site response organizations with the on-site response to include a command and control system for the local and national response to any nuclear or radiological emergency.

3.3.1. Current situation

The coordination of activities of the off-site response organizations with on-site response is the responsibility of the Emergency Situation Commissions. The level of coordination depends on the emergency scale - local, regional, interregional, transboundary, etc. ROSATOM's emergency response units have the obligation to support local authorities with personnel and equipment.

A dedicated communication system including video conference between the main response organization has been established in order to coordinate the emergency response activities.

This criterion is fully met.

Facility response plans and response organizations exist (they are necessary conditions for obtaining license). There are predefined procedures of response for different types of radiation emergencies. These include the provision of information from the facility to the regional authorities. This is an especially important arrangement in the case of Severodvinsk where coordination of activities for on-site and local off-site response is required. If needed, additional resources (from e.g. EMERCOM) can be mobilized, based on emergency response plans. EMERCOM has the emergency plans of all the facilities including those located in Mirny, the only Closed Administrative and Territorial Formation in the Archangelsk Region. The emergency plans of the licensed organizations must be cleared by the main authorised participants of the emergency response.

Further efforts to develop arrangements for the response organization at the local level should be allocated mainly in areas with recognized higher risks.

3.4. IDENTIFYING, NOTIFYING AND ACTIVATING

Regarding the requirements set out in [1] for identifying, notifying and activating, the following appraisal criteria were investigated:

- Establish a 24 hours/day, 7 days/week contact point;
- Make aware of the radiological hazards for on-site managers of facilities (e.g. scrap metal processing facilities) and national border control authorities;

- Make sure first responders are aware of: the signs and symptoms, the appropriate notification and other immediate actions warranted if an emergency is suspected;
- Establish a system for promptly initiating an off-site response in the event of an emergency;
- Ensure response organizations have sufficient personnel;
- Inform the IAEA and other States of the State's single warning point of contact, responsible for receiving emergency notifications and information from other States and the IAEA.

3.4.1. Current situation

Establishing 24 hours/day, 7 days/week contact point

24/7 services exist in the Archangelsk Region with several hundred personnel forming the Emergency Response Units (dispatch centres). These centres are developed for identifying, notifying and activating the response to any emergency ("all hazard approach". The AMD EMERCOM operates the 24/7 dispatch service in Archangelsk. The 11 municipalities have their own 24/7 operating contact points (municipal dispatch centres).

This criterion is fully met.

Making aware of the radiological hazards for on-site managers of facilities (e.g. scrap metal processing facilities) and national border control authorities

Customs have radiation portal monitors and simple radiometers. Scrap reprocessing facilities have radiation portal monitors and simple radiometers for input control and radiometric laboratories for output control.

Scrap metal is not reprocessed in the Region, but the collected metal is transported out of the Archangelsk Region. There are strict requirements for dealers to monitor incoming material for radiation. This regulation led to a drastic decrease of the source in scrap metal problem. Rail transportation of scrap metal is monitored by portal monitors. Transportation is also monitored at national borders.

At the national level, this criterion is fully met.

Making sure first responders are aware of: the signs and symptoms, the appropriate notification and other immediate actions warranted if an emergency is suspected.

In the Region, the professional emergency response organizations are fully aware of the signs and symptoms. They are properly equipped. The plans and procedures contain the requirements and rules of notification.

The criterion is met.

Establishing a system for promptly initiating an off-site response in the event of an emergency

Operators of I - II category facilities have local warning systems and procedures to promptly initiate the off-site response. Information from the main facilities on the radiation situation are provided on a daily basis. When threatening operations at JSC "CS "Zvezdochka" or JSC "PA

"SEVMASH" (e.g., refuelling) are conducted, the facility, municipal and regional levels of response are activated.

The NDEP-008 project is a major contribution to the practical implementation of this requirement.

There are two different systems of classifications in the Russian Federation. The first classification is developed by the EMERCOM for the organization of off-site response for any emergency, including a radiation emergency. The second classification is developed by the ROSTECHNADZOR for the on-site response for the protection of personnel and the city of a NPP.

An overall approach to the classification of emergency situations in the RF reflects the "all hazard approach". Emergencies are classified by their nature and scale for timely off-site response to any emergency.

The classification of an abnormal situation as an emergency for certain cases, e.g., biological, chemical or radiation emergency is determined in [16]. The definition of a radiation emergency is based on quantitative and qualitative criteria. The qualitative criteria of a radiation emergency are on-scene observables and indicators. In accordance with the qualitative criteria, a radiation emergency is:

- Any fact of radioactive release from a carrier of radioactive material on nuclear reactor (nuclear submarine, ship, vehicle, satellite, etc.);
- Any fact of destruction of hull structures of a mobile nuclear installation;
- Any fact of loss, theft or discovery of orphan sources of ionizing radiation;
- Any fact of destruction of storage facility;
- Any accidents at nuclear installation of INES scale level 3 or higher.

The quantitative criteria of a radiation emergency are set in terms of measurable levels of radioactive contamination of the environment and exposure dose rate from hull structures of radiation sources which could be accessible for members of the public.

Generic classification of an emergency by its severity is provided in [17]. This classification is used for the organization of off-site response for any emergency, including a radiation emergency. Classification criteria are presented in Table 3.

TABLE 3. CLASSIFICATION OF EMERGENCY BY ITS SEVERITY

Emergency class	Number of injured people	Material loss, thousand roubles'	Location of emergency zone
Local	Not higher than 10	Not higher than 1,000	Within the facility's territory
Municipal	Not higher than 50	Not higher than 5,000	Within one settlement or internal municipal territory of a town of the federal level
Inter-Municipal	Not higher than 50	Not higher than 5,000	Within two or more settlements or internal municipal territories of a town of the federal level or territory between settlements

Regional	51-500	5,000-500,000	Within subject of the Federation
Interregional	51-500	5,000-500,000	Within two or more subjects of the Federation.
Federal	More than 500	More than 500,000	Is not defined

Also, a number of regulations and international conventions define the class of transboundary emergency, which is defined as an emergency that has occurred in Russia, but goes beyond its territory, or an emergency that has occurred abroad but affects the territory of Russia.

If used together, this classification could provide a basis for the graded approach in the response to radiation emergencies associated with different facilities and activities. Nevertheless, such an approach was not fully implemented. The emergency plans of the nuclear and radiation hazardous facilities contain data for various types and classes of emergencies, starting from the local and higher levels.

The classification of emergencies mainly for the purposes of protection of on-site personnel is developed only for nuclear power plants [18] and nuclear fuel cycle facilities [19]. The classification includes only two categories "Emergency preparedness" and "Emergency situation" and is given in Table 4.

TABLE 4. CRITERIA FOR DECLARATION OF "EMERGENCY PREPAREDNESS" AND "EMERGENCY SITUATION" CONDITIONS AT NPP

Monitored parameter and monitored area	Emergency class	
	"Emergency preparedness"	"Emergency situation"
Ambient dose equivalent dose rate (μSv/h)		
Premises of permanent residence of staff in controlled area of NPP	> 10	> 600
Other territory of NPP site and SPZ	> 2.5	> 200
Surveillance zone of NPP	> 0.1	> 20
Airborne concentration of I-131 (Bq/m^3)		
Premises of permanent residence of staff in controlled area of NPP	> 1100	> 29000
Other territory of NPP site and SPZ	> 275	> 9700
Surveillance zone of NPP	> 7	> 670

Several documents are issued for the purpose of investigation operational violations in the event of an emergency at radiation facilities [20, 21, 22]. The INES scale [23] is used in these documents as a base for the classification and communication of operational violations.

Therefore, the emergency classification according to GS-R-2 has not been implemented. In this context it is recommended, that the international guidance on the graded approach for the classification of radiation emergencies should be implemented and linked with the concept of operation and threat assessment.

<u>This criterion is partly met.</u>

Ensuring response organizations have sufficient personnel

Professional municipal and regional emergency response units and facility emergency response teams are properly staffed and trained.

This criterion is met.

Informing the IAEA and other States of the State's single warning point of contact responsible for receiving emergency notifications and information from other States and the IAEA

The SCC ROSATOM is the single official national warning point for emergency communication with the IAEA. Communication of regional emergency management with SCC ROSATOM and IEC of the IAEA were exercised during the emergency exercises "Arktic-2011". There are regional agreements for direct receipt of notification from Norway and Finland in case of a radiation emergency on their territories.

The criterion is fully met.

Good practice: Arrangements for the direct notification exchange with Norway and Finland strengthen the regional cooperation and effectiveness of an emergency response.

3.4.2. Recommendation

1. Emergency classification system from the international requirements [1] should be implemented.
2. Written instruction for the first responders (i.e., police, first aid, fire-fighters, and other emergency workers) on how to respond to a nuclear or radiological emergency should be made available including mainly information on recognition of the radiation event (e.g., radiation signs, transport codes); identification of whom to call to report the event; guidance on how to secure the site and protect those on-site; the risks associated with radiation; and guidance on how to avoid potential contamination while rendering first aid to injured persons.

3.5. TAKING MITIGATORY ACTIONS

Regarding the requirements set out in [1] for taking mitigatory action, the following appraisal criteria were investigated:

- Make arrangements to provide prompt expertise and services in radiation protection to local officials and first responders to actual or potential emergencies involving practices in threat category IV.
- The operator of the practice in threat category IV shall be given basic instructions.
- Make arrangements to initiate a prompt search and issue a warning to the public in the event of the loss of a dangerous source.
- Make arrangements for mitigatory action to prevent an escalation of the threat; to return the facility to a safe and stable state; to reduce the potential for releases of radioactive materials or exposures; and to mitigate the consequences of any actual releases or exposures.

3.5.1. Current situation

Making arrangements to provide prompt expertise and services in radiation protection to local officials and first responders to actual or potential emergencies involving practices in threat category IV

Many first response teams of various departmental subordinations are equipped with radiation survey equipment, in particular, the mobile labs. The radiation survey equipment is certified for application in activities related to assessment of radiation situation.

The new mobile laboratories of the NDEP-008 project are a remarkable improvement in available capabilities in other areas. All elements of the NDEP-008 project are enhancing this capability.

This criterion is met.

Giving the operator of the practice basic instructions in threat category IV

Facilities which use radioactive sources have basic instructions that are mandatory license conditions. The transportation of radioactive materials and sources is supported by documentation containing instructions for first responders and these activities are under the control of the AMD EMERCOM, operators, Rostechnadzor, etc. emergency response units. The local response organizations are informed of the transportation of radioactive and nuclear materials.

The operators of mobile nuclear objects, carriers of spent nuclear fuel, radioactive waste and radioactive sources in the Archangelsk Region are licensed to carry out these types of works. The availability of an emergency plan is one of the main conditions of license issuing.

Therefore this criterion is fully met.

Making arrangements to initiate a prompt search and issuing a warning to the public in the event of the loss of a dangerous source

Response to some past emergencies (stolen and found radiation sources) shows that the arrangements are in place. The operator informed the law enforcement agency and, in parallel, the AMD EMERCOM. Then AMD EMERCOM initiated the response, including informing local fire brigades and local medical services for expected symptoms of overexposure. The perpetrators were found in a hospital; the stolen source was also found.

This criterion can be considered as being met.

Making arrangements for mitigatory action to prevent an escalation of the threat; to return the facility to a safe and stable state; to reduce the potential for releases of radioactive materials or exposures; and to mitigate the consequences of any actual releases or exposures

It is the responsibility of the on-site response unit and special technical support units. Just as everywhere else, in the Region fulfilment of this requirement is part of the emergency plans and a condition of the license. The infrastructural improvement provided by the NDEP-008 project is an enhancement in fulfilling this requirement.

The criterion is fully met.

3.5.2. Recommendation

The emergency plans of municipal authorities as well as instructions for first responders should include a detailed procedure on how to obtain expertise and assistance for dealing with different radiological aspects in case of an emergency that exceeds their own response capabilities, including category IV accidents (although the categorization in the RF does not follow the one recommended by GS-R-2).

3.6. TAKING URGENT PROTECTIVE ACTIONS

Regarding the requirements set out in [1] for taking urgent protective action, the following appraisal criteria were investigated:

- Adopt national intervention levels for taking urgent protective action in accordance with international standards;
- Make arrangements for effectively making and implementing decisions on urgent protective actions to be taken off-site;
- Make arrangements to ensure the safety of all persons on-site in the event of a nuclear or radiological emergency.

3.6.1. Current situation

Adopting national intervention levels for taking urgent protective action in accordance with international standards

Generic Intervention Levels (GILs) adopted in RF [11] are in compliance with current international requirements [1]. They are applied on a regional and facility level, as well. Nevertheless, the new system of generic criteria set by the GSG-2 [10] is not implemented yet.

One of the criteria for protective actions is for the concentration of I-131 in air and food. It was recognized during a discussion with a representative of AMB ROSPOTREBNADZOR that regional and municipal sanitary service does not have the capability for monitoring I-131 in the vicinity of nuclear installations. Methods and devices for evaluation of Cs-137 and Sr-90 in the environment and foodstuffs are certified and available in the event of a radiation emergency.

This criterion is partly met.

Making arrangements for effectively making and implementing decisions on urgent protective actions to be taken off-site

Local authorities in the vicinity of facilities from I - II hazard category [5] have a "Population Protection Plan" coordinated with the facilities' "Personnel Protection Plan".

The criterion is fully met.

Making arrangements to ensure the safety of all persons on-site in the event of a nuclear or radiological emergency

All radiation hazardous facilities [5] have a "Personnel Protection Plan" which is mandatory condition for the license. The ROSTECHNADZOR developed for several groups of radiation facilities a requirements to content of such plans [24, 25, 26, 27].

This criterion is fully met.

3.6.2. Recommendation

1. Competent authorities should evaluate the adoption of new intervention levels in emergency plans and procedures of operators and relevant off site response organizations.
2. To start as soon as possible revision of criteria for use in preparedness and response to nuclear or radiological emergencies which are defined by GSG-2 [10].
3. Capabilities for monitoring I-131 in the environment and foodstuffs have to be developed.

3.7. PROVIDING INFORMATION, ISSUING WARNINGS AND INSTRUCTIONS TO THE PUBLIC

Regarding requirements set out in [1] for providing information, warning and instructions to the public, the following appraisal criterion was investigated:

- Make arrangements to provide prompt warning and instructions to the permanent, transient and special population group or those responsible for them and to special facilities in the emergency zones upon declaration of an emergency class.

3.7.1. Current situation

The information response is a part of the "Population Protection Plan" coordinated with the facilities' "Personnel protection plan".

In Severodvinsk, there is a standard warning system (stationary loudspeakers around the settlement, cable TV and internet site). In Archangelsk, the information to the general public is undertaken partly by the AMD EMERCOM (precautionary measures) and by the Governor's office (official announcements by the Governor or his/her press office). Testing the communication facilities was performed during the "Arctic-2011" exercise.

Before and during the "Arctic-2011" exercise, a number of press releases were issued by responding parties through the mass media. These press releases contain general information on the exercise and its evaluation, for instance:

- Press-release of JSC "CS "Zvezdochka" (13.07.2011):
  http://www.star.ru/index.php?page=562
- Press-release of the Government of Archangelsk Region (14.07.2011):
  http://www.dvinaland.ru/prcenter/release/21899/
- Press-release of the Administration of Severodvinsk (13.07.2011):
  http://www.severodvinsk.info/pr/2801/
- Press-release of the ROSHYDROMET:
  http://www.meteorf.ru/rgm3d.aspx?RgmFolderID=a4e36ec1-c49d-461c-8b4f-167d20cb27d8&RgmDocID=02bbf3e9-ba6d-4e7b-aeb6-0a9ffa40d63c

The mass media were not used for informing the public during the exercise. Information provided by the responding parties was not coordinated and was not provided from one point. The requirement to have coordinated provision of information, as well as to have single source of information during emergency was not met (as requested in para. 4.84 of GS-R-2 and para. 4.36 of GS-G-2.1).

The criterion is partly met.

3.7.2. Recommendation

1. The administration of Severodvinsk has to establish arrangements for the coordination of public communication during emergency and implementation of a one point approach to information response.
2. Typical press releases in plain language have to be established in advance as a part of emergency preparedness.

3.8. PROTECTING EMERGENCY WORKERS

Regarding requirements set out in [1] for providing protection to emergency workers, the following appraisal criterion was investigated:

Make arrangements for taking all practicable measures to provide protection for emergency workers and response personnel.

3.8.1. Current situation

The facilities' "Personnel Radiation Protection Plan" provides proper instructions for the emergency response units. Emergency workers and other specialists involved have protective clothes, respiratory protection and personal dosimeters.

Particularly, in the Region, iodine prophylaxis, chemical protection, sorbents (Prussian blue) and protective clothing are available in the Severodvinsk from municipal medical service and at the facilities from the facility response organization. Direct reading operational dosimeters are also available.

Appropriate steps must be taken for the sustainable improvement of the protection of local emergency workers (including police, medical response and fire brigades) and those who may respond to an emergency on site. This should include providing further training in personal radiation protection and ensuring necessary measuring and protecting tools.

The emergency workers guidance levels should be revised against the internationally accepted guidance [10] to facilitate necessary compliance.

The role of emergency workers and first responders in case of radiation emergencies category IV emergency should be reassessed against the international guidance [1, 3].

The RF radiation safety regulation [11] defines two categories of people which exposure to ionizing radiation is regulated:

- personnel (Groups A and B);
- all public including persons from personnel beyond the sphere and conditions of their business.

The main dose limit of effective dose for group A occupational workers is 20 mSv per year, averaged for any consecutive 5 years, but no more than 50 mSv per year. The main dose limits as with all other allowable levels of exposure to personnel referred to in Group B, are equal to 1/4 of the values for personnel referred to in Group A. Hereinafter, in the text all normative values for personnel category are given only for Group A.

The main dose limit of effective dose for members of the public is 1 mSv per year, averaged for any consecutive 5 years, but no more than 5 mSv per year.

The current regulation does not define the category of emergency workers. Paragraph 3.2.4. from [11] defines that persons who are not related to the staff, but are attached to the emergency and rescue work should be drawn up and approved to work as group A occupational workers. This could be done in advance for some specific groups of rescuers, e.g. firefighters from special brigades supporting the radiation facility. All other first responders should be treated as members of the public and should not be used in emergency work if a planned dose will be above 5 mSv.

Section 3.2 of NRB-99/2009 [11] sets out the requirements for the planning of exposure of occupational workers above the dose limits. It requires getting the permission from the sanitary service for elevated exposure (above 50 mSv) to emergency workers. The planned exposure with doses in between 50-100 mSv could be premised by regional branches: by AMB ROSPOTREBNADZOR or RD58 FMBA in the case of Archangelsk Region. Planned exposure with doses in between 100-200 mSv could be premised only by headquarters: ROSPOTREBNADZOR or FMBA depending on the jurisdiction. This requirement would lead to a delay in the implementation of urgent protective actions, e.g. lifesaving operations. Lessons learned from emergency exercises shows that the minimal time needed for receiving such permission is about 1 hour.

An effective national system for managing the information on emergency workers doses should be developed.

The criterion is not fully met

3.8.2. Recommendation

1. Category of emergency workers has to be defined in the regulation in compliance with international guidance.
2. The emergency workers guidance levels should be revised against the internationally accepted guidance [10] to facilitate necessary compliance.

3.9. ASSESSING THE INITIAL PHASE

Regarding the requirements set out in [1] for assessing the initial phase, the following appraisal criterion was investigated:

- Establish default operational intervention levels (OILs) for radiological emergencies.

3.9.1. Current situation

The values recommended by the IAEA for the first response [4] were adopted for use by EMERCOM's rescue teams (first responders) in response to radiological emergencies. Several sets of criteria for use in response to nuclear emergency at particular nuclear facilities have also been developed [28, 29]. OILs were developed on the basis of the emergency criteria of NRB-99 equal to generic criteria from the current NRB-99/2009 [11]. Therefore, some values exist, but they are not fully consistent with the international recommendations. Facilities have operational indicators that are occasionally set to indicate technological limit violations (facility conditions), but not as a radiation protection operational limit. No OILs exist in the country for making decisions regarding protection of the general public.

This requirement has not yet been fully implemented

3.9.2. Recommendation

1. The OILs should be developed (preferably in compliance with international standards) and made known to all responding organizations. The procedures on how to measure different samples to be compared with Operational Intervention Level (OIL) should be exercised.
2. In the emergency response plans, which consider radiological emergencies, or in appropriate procedures, the concept of use of areas (safe distances) (EPR-Method) should be introduced.
3. The methodology for revising of OILs in case of a nuclear accident should be considered.
4. Data from regional and neighbouring regions should be merged and made available to the relevant response organizations.

3.10. MANAGING MEDICAL RESPONSE

Regarding the requirements set out in [1] for managing medical response, the following appraisal criteria were investigated:

- Make arrangements for general practitioners and emergency staff to be made aware of the medical symptoms of radiation exposure and of the appropriate notification procedures if a nuclear or radiological emergency is suspected;
- Make arrangements, at national level, to provide initial treatment for people who have been exposed or contaminated.

3.10.1. Current situation

Making arrangements for general practitioners and emergency staff to be made aware of the medical symptoms of radiation exposure and of the appropriate notification procedures if a nuclear or radiological emergency is suspected

Basic knowledge of medical symptoms of radiation exposure is part of the education and re-training programs for general practitioners and emergency staff in the RF. Specifically, general practitioners working in the JSC "CS "Zvezdochka" and JSC "PA "SEVMASH" are trained on this subject.

General practitioners in Archangelsk have limited/basic knowledge about the specific symptoms of radiation injuries, however additional training would be beneficial. The service of Medicine of Catastrophe has four brigades for radiological matters (mainly radiologists from oncology clinics). The time from notification to deployment is 4-6 hours. The medical staff should not enter the inner cordoned area, instead, they should take the victims from the rescue teams, and their response is coordinated with the EMERCOM first responders.

The role of the medical responders providing live saving actions should be reviewed following the relevant international guidance (First responders manual, Medical response [4]).

Making arrangements, at national level, to provide initial treatment for people who have been exposed or contaminated

At the national level this criterion is fully met. The responsibility and the operation of the special medical units are coordinated by the Federal Medical-Biological Agency.

At the regional level, the local hospital (in Archangelsk) activates the specialized medical service upon information from EMERCOM. If victims are contaminated, there are facilities to decontaminate them. In case of serious radiation injuries, the victims can be treated in Moscow

or in St. Petersburg. There are sufficient quantities of stable iodine for staff of the local clinics and for patients (but not for the whole population).

3.10.2. Recommendation

The role of medical services during radiation emergencies should be reviewed, mainly in relation to life saving actions, following international guidance.

3.11. KEEPING THE PUBLIC INFORMED

Regarding the requirements set out in [1] for keeping the public informed, the following appraisal criterion was investigated:

- Make arrangements for providing useful, timely, truthful and consistent information to the public, responding to incorrect information and rumours, responding to requests for information from the public and from the media.

3.11.1. Current situation

This is basically the responsibility of the designated public relations officer (Press Secretary) of any given 'Emergency Situation Commission'.

In Archangelsk, information management is the responsibility of the Governor's office. The press centre is in the building of the Regional Government, it maintains a roster of journalists who are invited at the press conferences, regularly held in case of an emergency situation. The regional EMERCOM of Russia also has responsibilities, especially regarding the initial provision of information and instructions to the public.

The criterion is fully met.

3.11.2. Recommendation

Establish training courses for the mass media to build competence in the area of radiation protection and capabilities for plain language explanations to the public regarding the problems related to the basics of radiation protection and safety.

3.12. TAKING AGRICULTURAL COUNTERMEASURES AGAINST INGESTION AND LONGER TERM PROTECTIVE ACTIONS

Regarding the requirements set out in [1] for taking agricultural countermeasures against ingestion and longer term protective actions the following appraisal criteria were investigated:

- Adopt national intervention and action levels for agricultural countermeasures;
- Make arrangements, concentrating on the use of existing capabilities, for taking effective agricultural countermeasures.

3.12.1. Current situation

Adopting national intervention and action levels for agricultural countermeasures

This criterion is fully met; the national intervention and action levels are in compliance with international recommendations.

Making arrangements, concentrating on the use of existing capabilities, for taking effective agricultural countermeasures

In the Archangelsk region, the local agricultural activity is limited (milk, eggs, poultry, game, wild berries, mushrooms and fish); in some areas there is no agricultural production or activities are only minimum. In the case of an emergency, effective countermeasures are planned to be introduced for the control of local foodstuffs and are coordinated by the relevant response organisation. These decisions are supported by regulatory and supervision authorities responsible for health and food control.

This criterion can be considered as being met.

3.12.2. Recommendation

Agricultural countermeasures and long term protective actions should be addressed and exercised in the frame of specialized regional or national level exercises focused on arrangements for long term protective measures.

3.13. MITIGATING NON-RADIOLOGICAL CONSEQUENCES OF THE EMERGENCY AND RESPONSE

Regarding the requirements set out in [1] for mitigating non-radiological consequences of the emergency and response, the following appraisal criterion was investigated:

- Make arrangements for responding to public concern in an actual or potential nuclear or radiological emergency.

3.13.1. Current situation

In the Region, the "Medicine of Catastrophe" organization has a brigade specialized in providing psychological counselling and support to the public in the case of an emergency. The information strategy of the Governor's office also takes account of this issue and addresses it. This issue is also addressed by the public communication activities during the radiation emergencies according to the response planning.

This criterion can be considered as being met.

3.13.2. Recommendation

Establish training courses for the mass media to build capabilities for plain language explanation to the public regarding the self-protective measures which have to be taking in event of radiation emergency.

3.14. REQUIREMENTS FOR INFRASTRUCTURE

Regarding the requirements set out in [1] for infrastructure, the following appraisal criteria were investigated:

- Develop emergency plans that are consistent with the threats and coordinated with all response organizations;
- Operating and response organizations shall develop procedures needed to perform their response functions;
- Provide, concentrating on the use of existing capabilities, adequate tools, instruments, supplies, equipment, communication systems, facilities and documentation;
- Identify facilities at which the following will be performed: (a) coordination of on-site response actions; (b) coordination of local off-site response actions (radiological and conventional); (c) coordination of national response actions; (d) coordination of public information; (e) coordination of off-site monitoring and assessment;

- Make arrangements, concentrating on the use of existing capabilities, for the selection of personnel and training;
- Conduct exercises and drills to ensure that all specified functions required to be performed for emergency response and all organizational interfaces for the facilities in threat categories I, II and III and the national level programmes for threat categories IV and V are tested at suitable intervals;
- Make arrangements to ensure the availability and reliability of all supplies, equipment, communication systems and facilities needed during an emergency.

3.14.1 Current situation

Developing emergency plans that are consistent with the threats and coordinated with all response organizations

An emergency plan is mandatory for the operator license. No license is issued without a proper facility emergency plan (local dangerous source). The local government also has its own regional emergency plan. Procedures are developed for each activity area of responders.

This criterion is fully met.

Need to develop procedures for operating and response organizations to perform their response functions

Written procedures are the necessary requirements for issuing of a license. They are the basis for the operation of emergency response organizations.

This criterion is fully met.

Providing adequate tools, instruments, supplies, equipment, communication systems, facilities and documentation

Emergency response units of ROSATOM have proper tools, instruments, equipment, supplies, communication systems and documentation.

The technical conditions of the operator, other than ROSATOM first responders, should be assessed.

The NDEP-008 project largely contributed to the improvement of the infrastructure. Stationary and mobile monitoring systems, communication tools, evaluation and prognostic software are upgraded and made available to the various organizations involved in the response.

The criterion is met.

Identifying facilities at which the following will be performed: (a) coordination of on-site response actions; (b) coordination of local off-site response actions (radiological and conventional); (c) coordination of national response actions; (d) coordination of public information; (e) coordination of off-site monitoring and assessment

According to the information available, the following facilities were identified:

1. Coordination of on-site response actions is provided by means of Emergency Management Commission room (emergency or crisis centre). I - II category facilities have Crisis Centres

and sheltered places for emergency centre, e.g. Joint Crisis Centre of JSC “CS “Zvezdochka” and JSC «NIPTB Onega»;

2. Coordination of off-site response actions is provided through the Municipal and Regional Emergency Management Commissions (situation/crisis centres have been established for their work). Commission for Prevention and Liquidation of Emergency Situations and Fire Safety of the Archangelsk Region coordinates activity of the Government of Archangelsk Region, the AMD EMERCOM, the Northern ROSHYDROMET, the RD58 FMBA, AMB ROSPOTREBNADZOR, ANB ROSTECHNADZOR, and government of the Archangelsk region;
3. Coordination of national response actions is provided by the Governmental Commission for Prevention and Liquidation of Emergency Situations and Fire Safety through the National Crisis Situation Management Centre of EMERCOM of Russia (NCSMC EMERCOM of Russia) in coordination with:
   - Situation Crisis Centre of ROSATOM (SCC ROSATOM);
   - Technical Crisis Centre of IBRAE RAN (TCC IBRAE RAN);
   - Emergency Medical Radiation and Dosimetry Centre of "A.I. Burnazyan Federal Medical and Biophysical Centre" of FMBA (EMRDC FMBA);
   - Crisis Centre of FSUE «Krylov CNII»;
   - Specialized Centre of SPA “Typhoon”;
   - Representatives of other federal executive authorities.
4. Public information officer/team at the facility, municipal and regional level;
5. Coordination of off-site monitoring and assessment is provided the Northern DHEM, CHEM-R of ROSHYDROMET.

This criterion can be considered as being met.

Making arrangements, concentrating on the use of existing capabilities, for the selection of personnel and training

According to the information available, sufficient equipment and response personnel is provided at the key organisations. The integrated approach promotes the use of existing capabilities dedicated for emergencies other than radiation emergencies. The conditions in ad-hoc cases were discussed with the representatives of facilities that were met with during the mission, e.g. ROSATOM declared that they have a good basis for the selection and training of personnel.

This criterion can be considered as being met.

Conducting exercises and drills to ensure that all specified functions required to be performed for emergency response and all organizational interfaces for the facilities in threat categories I, II and III and the national level programmes for the threat categories IV and V are tested at suitable intervals

Exercising and special job-related drills are part of the training for personnel of the nuclear and radiation hazardous facilities, including for every dangerous operation involving nuclear fuel (emergency preparedness measures included). Nuclear and radiation hazardous facilities have schedules for regular exercises. Larger scale field or table top exercises are organized occasionally based on a pre-defined schedule (at least once a year) at nuclear and radiation hazardous facilities.

The conducted exercise “Arctic-2011” with the involvement of territorial and facilities’ systems of response showed the necessity of regular training through similar exercises under the management of the Regional Government.

This criterion is fully met.

Making arrangements to ensure the availability and reliability of all supplies, equipment, communication systems and facilities needed during an emergency

Compliance with this requirement is ensured by the Quality Assurance system which is mandatory for the license. This is an ongoing activity, with varying actual levels of availability and quality of all supplies, equipment, communication systems and facilities. The NDEP-008 project provided a strong boost in this regard.

This criterion is fully met.

The maintenance of competence in all first response teams is a long term task, requiring a well-designed training program, human resource management and exercises. The on site and off site local first response units, as well as local officials and other bodies responsible for responding to the emergencies should be trained on radiation protection on a regular basis. The scenario for drills and exercises should include a component for radiological emergencies. It will enable qualified personnel at the local levels, which can be mobilized in case of any emergency involving the hazard of ionizing radiation.

3.14.2. Recommendation

1. A set of criteria should be developed to assist in emergency exercises and drills evaluation. These criteria will be used as objective indicators: how well the exercise met its objectives.

2. The newly developed system at the Northern DHEM and CHEM-R of ROSHYDROMET for the prediction of dispersion of released radioactive materials should be used in exercise conditions as a basis for decision making.

APPENDICES

APPENDIX I. MISSION TEAM COMPOSITION

Karol Janko	Vice Chairman of the Nuclear Regulatory Authority of Slovak Republic
Vladimir Kutkov	Consultant of the Incident and Emergency Centre, IAEA
Peter Zombori	Team Leader, Emergency Preparedness Officer of the Incident and Emergency Centre, IAEA

APPENDIX II. WORK DONE AND PERSONS MET

Review of Objectives and Scope of NDEP-008

Person and affiliation	Presentation	@
Mr. Leonid Bolshov, Director of IBRAE RAN	Welcoming remarks of the representatives of the IBRAE RAN	**A**
Mr. Ashot Sarkisov, Academician of the Russian Academy of Sciences, IBRAE RAN	Scope of NDEP-008	**A**
Mr. Igor Osipyants, Director of Department of ESAC IBRAE RAN	Results of NDEP-008	**A**
Mr. Konstantin Ogar, Deputy Director of the Department of ESAC IBRAE RAN	Summary of the Project NDEP-008	**A**
Ms. Larisa Shpinkova, Head of office of ESAC IBRAE RAN	Logistics of the EPREV mission of the IAEA	**A**

Evaluation of Radiological Threats in Archangelsk Region

Person and affiliation	Presentation	@
Mr. Ivan Shabalin, Head of the Agency of natural resources and ecology of the Archangelsk Region	Welcoming remarks of the representatives of the Government of the Archangelsk Region	**B**
Mr. Peter Zombory, IAEA	Welcoming remarks of the representatives of IAEA mission	**B**
Ms. Olga Ishenina, Consultant of the Agency of natural resources and ecology of the Archangelsk Region	Description of the Archangelsk Region	**B**
Mr. Anatoly Shepurev, Head of the Department of nuclear and radiation safety and Deputy Chief engineer of JSC “CS “Zvezdochka”	General description of the main radiation-hazardous facilities at JSC “CS “Zvezdochka”	**B**
Mr. Mikhail Malinin, Head of Department for nuclear and radiation safety of JSC ”PA “SEVMASH”	General description of the main radiation-hazardous facilities at JSC ”PA “SEVMASH”	**B**
Mr. Igor Osipyants, Director of Department of ESAC IBRAE RAN	Presentation of the results of work under the NDEP-008 project	**B**
Mr. Oleg Koshevoy, Deputy Head of the Department for immediate response – Head of Office for operative planning of AMD EMERCOM	Review of the basic laws and regulations for RSES territorial subsystem of the Archangelsk Region	**B**
Mr. Valentin Magomedov, Head of Civil Defense Department of Severodvinsk Municipality	Review of the basic laws and regulations for protection of population and territories at local level in case of radiation emergency	**B**
Mr. Nikolay Badanin Head of Department for civil defense and emergency situations of JSC “CS “Zvezdochka”, head of the Joint Local Crisis Center (LCC) of JSC “CS “Zvezdochka” and	Emergency preparedness at nuclear- and radiation-hazardous facilities. Interaction with other organizations and plans of personnel protection in case of radiation emergency.	**B**

JSC «NIPTB Onega»		
Mr. Igor Osipyants, Director of Department of ESAC IBRAE RAN	General issues of IAEA mission activities. Discussion of schedule of work and visits of IAEA mission.	**B**

Evaluation of EPR Organization at Facility Level

Person and affiliation	Presentation	@
Mr. Vladimir Kamenev, Director of NWB IBRAE RAN	Welcoming remarks of the representatives of the radiation-hazardous facilities of Severodvinsk	**C**
Mr. Nikolay Badanin Head of Department for civil defense and emergency situations of JSC "CS "Zvezdochka", head of the Joint LCC of JSC "CS "Zvezdochka" and JSC «NIPTB Onega»	Emergency preparedness and response at JSC "CS "Zvezdochka"	**C**
Mr. Anatoly Shepurev, Head of the Department of nuclear and radiation safety and Deputy Chief engineer of JSC "CS "Zvezdochka"		
Mr. Sergey Popov, Deputy Chief engineer of JSC «NIPTB Onega»	Emergency preparedness and response at JSC «NIPTB Onega»	**C**
Mr. Vasily Berezin, Chief technologist of JSC «NIPTB Onega»		
Mr. Mikhail Malinin, Head of Department for nuclear and radiation safety of JSC "PA "SEVMASH"	Emergency preparedness and response at JSC "PA "SEVMASH"	**C**
Mr. Alexander Filatkin, Deputy Head of Department for nuclear and radiation safety of JSC "PA "SEVMASH"		
Mr. Eugeny Kharitonov, Head of Laboratory of JSC "PA "SEVMASH"		
Mr. Yulyan Tereshko, Head of Laboratory of JSC "PA "SEVMASH"		
Mr. Yury Perov, Head of Department for civil defense and emergency situations of JSC "PA "SEVMASH"		

Evaluation of EPR organization at municipal level

Person and affiliation	Presentation	@
Mr. Michael Gmyrin, Mayor of Severodvinsk Municipality	Review of Severodvinsk municipality	**D**
Mr. Alexander Bizyukov, Deputy Mayor of Severodvinsk Municipality for urban economy	Terms of Administration of Severodvinsk Municipality	**D**
Mr. Valentin Magomedov, Head of Civil Defence Department of Severodvinsk Municipality	Organization of government actions and capabilities of the municipal level of RSES during a radiation emergency	**D**

Mr. Aiexey Nekrasov, Head of the RD58 FMBA	The main tasks of the bodies and institutions of FMBA to implement the State Sanitary and Epidemiological Surveillance	**D**
Mr. Vladimir Vashchenko, Chief doctor of CHE58 FMBA		**D**
Mr. Pavel Kolosov, Head of CMSU58 FMBA	The organizational structure of forces and resources to provide medical care for radiation hazardous facilities of JSC ”PA “SEVMASH”	**D**
Mr. Vyacheslav Shirin, Chief specialist of the Department of Public Health of Severodvinsk Municipality	The organization of medical response for emergency situations of technogenic nature in Severodvinsk Municipality	**D**
Mr. Nikolay Savin, Municipal police of Severodvinsk Municipality	Activity of Severodvinsk police to maintain public security during radiation emergency	**D**
Mr. Gennady Frolov, EMRDC FMBA	General discussion on the capability of the Severodvinsk government for protection of the public in case of radiation emergency	**D**
Mr. Yury Salenko, EMRDC FMBA		

Evaluation of EPR organization at regional level

Person and affiliation	Presentation	@
Mr. Sergey Pukanov, Deputy Head of Northern ROSHYDROMET	Terms of the Northern ROSHYDROMET	**E**
Ms. Alvina Sobolevskaya, Head of CHEM-R	Activity of CHEM-R	**E**
Mr. Mikhail Busin, Head of AMD EMERCOM	Terms of AMD EMERCOM on coordination of preparedness and response to conventional emergency in the Archangelsk Region	**F**
Mr. Oleg Koshevoy, Deputy Head of the Department for immediate response – Head of Office for operative planning of AMD EMERCOM	Terms of AMD EMERCOM on coordination of preparedness and response to radiation emergency in the Archangelsk Region	**H**
Mr. Alexandr Uvarov, Head of Centre for maintenance of civil protective actions of AMD EMERCOM		
Mr. Valery Davidov, Acting Head of Crisis Situation Management Centre of AMD EMERCOM	Activity of Crisis Situation Management Centre of AMD EMERCOM	**F**
Mr. Dmitry Yakushkin, Expert of Division for technical measure for radiation, chemical, biological and medical protection of AMD EMERCOM	Activity of AMD EMERCOM	**F**
Mr. Igor Polivanny, Head of Rescue service of AMD EMERCOM		
Mr. Alexandr Uvarov, Head of Centre for maintenance of civil protective actions of AMD EMERCOM		

Mr. Aiexey Nekrasov, Head of the RD58 FMBA Mr. Viktor Golubtsov, Acting Head of the CMSU58 FMBA	Terms of RD58 FMBA in preparedness and response to radiation emergency at radiation facilities under jurisdiction of MINPROMTORG located in the Archangelsk Region	**H**
Mr. Denis Prikhod'ko, Acting Head of ANB ROSTECHNADZOR	Terms of ANB ROSTECHNADZOR in preparedness and response to radiation emergency in the Archangelsk Region	**H**
Mr. Alexandr Tulisov, Senior expert of Sanitary Division of AMB ROSPOTREBNADZOR	Terms of AMB ROSPOTREBNADZOR in response to radiation emergency in the Archangelsk Region	**H**
Ms. Olga Ishenina, Consultant of the Agency of natural resources and ecology of the Archangelsk Region	Legislative base for coordination of preparedness and response to radiation emergency in the Archangelsk Region	**J**

Evaluation of Capabilities for National support of EPR in Archangelsk Region

Person and affiliation	Terms	@
Mr. Nikolay Kuchin, Head of laboratory of radiation and ecological safety of FSUE «Krylov CNII» Mr. Valery Balabin, Senior scientific officer of FSUE «Krylov CNII»	Terms of FSUE «Krylov CNII» in preparedness and response to radiation emergency at radiation facilities under jurisdiction of MINPROMTORG located in the Archangelsk Region	**H**
Mr. Vladimir Kamenev, Director of NWB IBRAE RAN Mr. Nikolay Scherbinin, Vice Director of NWB IBRAE RAN Mr. Vladimir Khandobin, Director of Murmansk Branch of IBRAE RAN	Terms of regional branches of IBRAE RAN in response to radiation emergency at regional radiation facilities	**H**
Mr. Igor Osipyants, Director of Department of ESAC IBRAE RAN Mr. Vladimir Evseev, Head of Centre for Inventory of Radioactive Material and Radioactive Waste of IBRAE RAN Mr. Oleg Pavlovsky, Head of Laboratory of IBRAE RAN Mr. Vladimir Kiselev, Head of Laboratory of IBRAE RAN Mr. Sergey Krasnoperov, Scientific Officer of IBRAE RAN	Terms of TCC IBRAE RAN and ESAC IBRAE RAN in response to radiation emergency at regional radiation facilities	**H**
Mr. Yury Salenko, EMRDC FMBA	Terms of EMRDC FMBA in response to radiation emergency in the Archangelsk Region	**H**
Mr. Alexandr Panfilov, Head of Division of DNRS ROSATOM	Terms of DNRS ROSATOM and SCC ROSATOM in response to radiation emergency in the Archangelsk Region	**J**

Assessing Capability for Emergency Response at Regional Level

Person and affiliation	Role	@
Mr. Alexey Vereschagin, the Deputy Governor of the Archangelsk Region	Head of CESF-AR	**I**
Mr. Mikhail Busin, Head of AMD EMERCOM	Deputy Head of CESF-AR	
Mr. Alexandr Panfilov, Head of Division of DNRS ROSATOM	Observer from ROSATOM	**I**
Ms. Jane Smith-Briggs, Operation Leader of NDEP-008, Nuclear Safety Department of EBRD	Observer from EBRD	**I**
Mr. Sergey Bocharov, Manager of NDEP-008, Nuclear Safety Department of EBRD	Observer from EBRD	**I**
Ms. Inger Eikelmann, Senior Advised of Department for Emergency Preparedness and Environmental Radioactivity, Norway	Observer from EPR AC	**I**
Ms. Anna Nalbandyan, Researcher of Department for Emergency Preparedness and Environmental Radioactivity, Norway	Observer from EPR AC	**I**
Mr. Karol Janko, Vice Chairman, Nuclear Regulatory Authority, Slovak Republic	Observer from IAEA	**I**

Assessing Capability for Emergency Response at Facility Level

Person and affiliation	Role	@
Mr. Oleg Frolov, Chief Engineer of JSC "CS "Zvezdochka"	Head of Joint CESFS of JSC "CS "Zvezdochka" and JSC «NIPTB Onega»	**K**
Mr. Anatoly Shepurev, Head of the Department of nuclear and radiation safety and Deputy Chief engineer of JSC "CS "Zvezdochka"	Deputy Head of Joint CESFS of JSC "CS "Zvezdochka" and JSC «NIPTB Onega»	**K**
Mr. Nikolay Badanin, Head of Department for civil defense and emergency situations of JSC "CS "Zvezdochka", Head of the Joint LCC of JSC "CS "Zvezdochka" and JSC «NIPTB Onega»	Member of Joint CESFS of JSC "CS "Zvezdochka" and JSC «NIPTB Onega»	**K**
Mr. Sergey Popov, Deputy Chief engineer of JSC «NIPTB Onega»	Member of Joint CESFS of JSC "CS "Zvezdochka" and JSC «NIPTB Onega»	**K**
Mr. Vladimir Evseev, Head of Centre for Inventory of Radioactive Material and Radioactive Waste of IBRAE RAN	Observer from IBRAE RAN	**K**
Mr. Vladimir Kamenev, Director of NWB	Observer from IBRAE RAN	**K**

IBRAE RAN		
Mr. Nikolay Scherbinin, Vice Director of NWB IBRAE RAN	Observer from IBRAE RAN	**K**
Mr. Vladimir Khandobin, Director of Murmansk Branch of IBRAE RAN	Observer from IBRAE RAN	**K**
Mr. Nikolay Kuchin, Head of laboratory of radiation and ecological safety of FSUE «Krylov CNII»	Observer from MINPROMTORG	**K**
Mr. Valery Balabin, Senior scientific officer of FSUE «Krylov CNII»	Observer from MINPROMTORG	**K**
Mr. Vladimir Kutkov, IAEA	Observer from IAEA	**K**

Assessing NDEP-008 Project "Enhancement of the System of Radiation Monitoring and Emergency Response in the Archangelsk Region"

Person and affiliation	Presentation	@
Mr. Alexey Vereschagin, the Deputy Governor of the Archangelsk Region, Head of CESF-AR	Role of NDEP-008 in enhancement of the emergency response capability in the Archangelsk Region	**L**
Mr. Vladimir Shishov, Deputy Governor of the Archangelsk Region on natural resources and ecology	Summary of exercise results and work under the NDEP-008 "Enhancement of the System of Radiation Monitoring and Emergency Response in the Archangelsk Region"	**L**
Ms. Jane Smith-Briggs, Operation Leader Nuclear Safety Department of EBRD	Assessment of the exercise and results of the NDEP-008 by European Bank for Reconstruction and Development	**L**
Mr. Vladimir Kutkov, IAEA	The results of IAEA mission activity. Assessment of the exercise and capability for response to radiation emergency in the Archangelsk Region	**L**
Mr. Oleg Frolov, Chief Engineer of JSC "CS "Zvezdochka"	The results of work under the project NDEP-008	**L**
Mr. Oleg Kuznetsov Deputy Chief Engineer of JSC "PA "SEVMASH"	The results of work under the project NDEP-008	**L**
Ms. Inger Eikelmann, Senior Advised of Department for Emergency Preparedness and Environmental Radioactivity, Norway	Assessment of exercise results by representatives of the Working Group on Emergency Prevention, Preparedness and Response of the Arctic Council	**L**
Mr. Sergey Pukanov, Deputy Head of Northern ROSHYDROMET	Significance of the project for Northern ROSHYDROMET mission	**L**
Mr. Igor Osipyants, Director of Department of ESAC IBRAE RAN	Completion of NDEP-008	**L**

APPENDIX III. TERMS OF REFERENCE OF THE IAEA EMERGENCY PREPAREDNESS AND RESPONSE REVIEW (EPREV) MISSION TO ARCHANGELSK REGION (RUSSIAN FEDERATION)

Background

The Northern Dimension Environmental Partnership Support Fund (NDEP) was established in 2002 to tackle major environmental challenges in north-west Russia. The NDEP Nuclear Window deals specifically with the legacy of the soviet fleet of nuclear submarines, ships and coastal maintenance bases. The NDEP Support Fund is managed by the European Bank for Reconstruction and Development (EBRD).

One of the urgent projects funded by the NDEP Nuclear Window is the enhancement of the radiation monitoring and emergency response (preparedness) in the Archangelsk Region (project NDEP-008).

The main objectives of the project are:

- Modernization of an early warning system on sites where nuclear submarine decommissioning, SNF and RW management activities are to be undertaken within the NDEP;
- Improvement of the emergency response effective functioning to the radiation factor in the Archangelsk Region by creating at the facilities and in the executive branch of modern situational/crisis Centres equipped with related information, technical and communications resources, by establishing an automated system for monitoring the radiological situation in the region, by providing scientific and technical support from the federal research Centres, and by integration of emergency response systems of the Archangelsk and Murmansk Regions;
- Provision of operative preparation capability of background information data to inform the local population, the executive bodies about the radio-ecological situation in the Archangelsk Region, including accidental releases.

The Government of the Archangelsk Region is the Grant Recipient and the Energy Safety Analysis Centre of IBRAE RAN is the main Contractor (as per the contract signed on March 5, 2009) to implement the project. The project is to be completed in September 2011.

At the suggestion of the ROSATOM and EBRD Secretariat, with support from the Government of the Archangelsk Region, ROSATOM has requested the IAEA to organize a mission to review the emergency preparedness (EPREV) in the Archangelsk Region.

Mission objectives

In general, EPREV missions are organized on the request of the governments of Member States to make an independent appraisal of the country's preparedness capabilities to respond efficiently to any nuclear or radiological emergency. The focus is on the assessment of compliance of the available EPR system with the international standards, specifically with the recommendations of the IAEA Safety Standards Series document No. GS-R-2 ('Preparedness and Response to a Nuclear or Radiological Emergency', IAEA, Vienna, 2002). This can cover the whole country's capabilities or can be limited to specific areas and aspects of emergency response.

In the current case, the requested assessment is limited to the nuclear and radiological emergency preparedness of the Archangelsk Region, with special regards to the situation connected with the legacy of the Soviet nuclear fleet.

Consequently, the specific objectives of the mission are as follows:

1. To provide an assessment of the Region's capability to respond to possible nuclear and radiological emergencies taking into account the specific conditions of the Region. (This may also involve observing an exercise planned to be carried out during the EPREV mission.);
2. To assess the Region's capability to respond to nuclear and radiological emergencies at facilities during the planned future decommissioning and cleanup operations;
3. To assist the Region in the development of interim arrangements to promptly respond to a nuclear or radiological emergency. This will include suggested steps that can be taken immediately to better use existing response capabilities;
4. To provide a basis upon which the Region can develop a longer-term programme to enhance their ability to respond to nuclear and radiological emergencies.

In addition to the usual issues above which the IAEA normally assesses in similar missions, there is a strong interest in determining the level of compliance between the objectives of the project NDEP-008 and the relevant international requirements regarding response to nuclear and radiological emergencies.

Scope

The mission will be carried out in accordance with the Guidelines developed for the EPREV services. As part of the methodology a questionnaire will be filled out, addressing the main issues and requirements of GS-R-2.

Emergency arrangements will be assessed at local and regional levels, specifically:

- Emergency management;
- Emergency preparedness;
- Law enforcement;
- Radiation protection;
- Medical response;
- Public information;
- Regional capability to support and provide training to local response teams.

Although the mission is related to the project NDEP-008, the mission's scope of activity will extend beyond the scope of the project in the sense that more general aspects (e.g. threat assessment, legal framework, assignment of responsibilities, functional and infrastructural requirements, training and exercises etc.) will also be addressed. The project NDEP-008 will be considered only regarding its impact on the emergency preparedness status in the Region. However, the detailed evaluation of the project is beyond the scope of the mission.

Period

Period of the mission: 05 - 14 July 2011

EPREV mission team

Peter ZOMBORI, IAEA (IAEA Coordinator, Emergency Preparedness Officer, Incident and Emergency Centre)

Vladimir KUTKOV (IAEA Consultant / Senior Scientific Officer, Kurchatov Institute, Russian Federation)
Karol JANKO (Vice Chairman, Nuclear Regulatory Authority, Slovak Republic)

Host side

- The Government of the Archangelsk Region;
- ROSATOM;
- MINPROMTORG represented by JSC "CS "Zvezdochka", JSC «NIPTB Onega», and JSC "PA "SEVMASH";
- The Administration of Severodvinsk.
-

Russian counterparts

Within the mission framework, the meetings with representatives of the following organizations will be organized:

- The Government of the Archangelsk Region;
- The Administration of Severodvinsk;
- AMD EMERCOM;
- ARSA "Centre to ensure activities of civil protection of the Archangelsk Region";
- JSC "CS "Zvezdochka"
- JSC «NIPTB Onega».
- JSC "PA "SEVMASH";
- FSUE «Krylov CNII»;
- Northern ROSHYDROMET;
- CHEM-R;
- IBRAE RAN.

The comprehensive emergency response exercise will be attended by representatives of organizations involved in the Archangelsk Regional Commission on disaster management and fire safety.

Conduct of the mission

It is assumed that this mission will meet the basic concept of an EPREV mission (defined in the Guidelines), which is to review all aspects of the Region's arrangements to respond to a nuclear or radiological emergency. The review is to be based principally on the international requirements in GS-R-2 and supporting IAEA guidance contained in the document EPR-METHOD ('Methods for Developing Arrangements for Response to a Nuclear or Radiological Emergency', IAEA, Vienna, 2003). The team members will also provide suggestions based on their experience and good international practices. In order to focus the effort and to provide insights that will be of immediate practical value, the mission will concentrate on: a) the ability to respond to a radiation emergency of different threat categories and b) and the ability of specific facilities in threat categories I, II and III to respond. The findings from these reviews can then be generalized.

In addition, the team will participate, as observers, in a comprehensive exercise organized during the mission period to test the regional capabilities to respond to a nuclear or radiation emergency.

The mission consists of two teams, each of which usually consists of two experts:

1. **Local and facility response review and assistance team:** This team will review the ability to rapidly and effectively identify and respond to nuclear and radiological emergencies in the first level of response. The review includes preparedness and response capabilities of health care. It will be conducted in accordance with the IAEA requirements (GS-R-2) and guidance contained in the EPR METHOD document for threat categories I, II, III and IV. The response capabilities at the local level (facility personnel, police, fire service, medical care) in the Archangelsk Region will be taken into consideration.
2. **Regional review and assistance team:** This team will review the response of regional level organizations that initiate or support local response and the ability of facilities in threat categories I, II and III to respond to an emergency. The review will be conducted against the IAEA requirements (GS-R-2) and guidance contained in the EPR METHOD document for threat categories III and V. This will focus on the off-site arrangements and regional level preparedness for threats like a) nuclear powered warships and submarines, b) nuclear installations and activities in the Region and in nearby countries, c) emergency due to malicious use of radioactive sources (RDD) and some special concerns (possible orphan sources). One of the goals will be to establish clearly the roles and responsibilities of the regional organizations as well as methods for coordination and management among the organizations that should form the basis for the team's recommendations.

Activity Output: A formal report that provides the following information for each of the "functional" and "infrastructure" requirements in GS-R-2:

- General description of the situation.
- Suggestions for interim actions to be taken to establish and/or improve the ability to respond in the near term. Suggestions will be based on commonly accepted international practice and IAEA guidance.
- Recommendations on long-term measures should comply with international requirements, successfully applied in practice.

Logistics: The Host side will provide or arrange for during the mission:

- Local transportation for each team.
- The Host will identify counterparts for each technical area in emergency preparedness and response.
- Access to the sites of comprehensive emergency response exercise in accordance with the plan of exercises.
- Organization of briefings and interviews with senior representatives of the facilities on the assessment of readiness for nuclear or radiological emergency issues (JSC "CS "Zvezdochka", JSC "PA "SEVMASH") as prescribed by Russian law.
- Place for team members' discussions and preparation of technical notes.
- Access to international telephone lines, internet, e-mail, personal computer, projector, printer and photocopier.
- The Host should also provide assistance in reserving hotel accommodations.

The IAEA will assume the costs of travel and accommodations for the experts participating in the mission. The Agency will provide the Host side with the credentials (passport data) of the team members (passport copies, forms, etc.) 120 days in advance of the mission.

Briefing: The Host will provide an overview briefing of the current situation (to include responsibilities, criteria etc.) concerning response to a nuclear or radiological emergency.

Interview/Facility Access: The Host side will make arrangements and provide the expert teams with a schedule to interview officials of the following authorities and/or have access to the following facilities.

Local and facility response review and assistance team: Organizations responsible for the response to a nuclear or radiological emergency in the Archangelsk Region should include, if possible, the following (this could be accomplished at combined meetings):

1. Responding organizations:
   - Civil Defence (fire fighters);
   - Health care organizations (first responders).
2. Facilities:
   - JSC "CS "Zvezdochka";
   - JSC "PA "SEVMASH".
3. Organizations providing support for responders on local and facility response level in the event of a radiological emergency:
   - - FSUE «Krylov CNII»;
   - - JSC «NIPTB Onega»;
   - - IBRAE RAN.
4. Regional review and assistance team. Regional level authorities/facilities that would support the local response to a radiological emergency and address regional issues to include those responsible for (this could be accomplished at combined meetings):
   - CESFS;
   - AMD EMERCOM;
   - ARSA "Centre to ensure activities of civil protection of the Archangelsk Region";
   - Northern ROSHYDROMET;
   - CHEM-R
   - IBRAE RAN.

Schedule and team assignments

Date	**Events**	
	Local and facility response review and assistance team	**Regional review and assistance team**
Day 0 July 4, 2011	Arrival in Archangelsk. Accommodation.	
Day 1 July 5, 2011	**Plenary meetings with all participants (Archangelsk, Archangelsk Regional Government)** Review of the schedule, presentations by the IAEA team and the counterparts, adopting the visit plan, discussions on the legal framework, etc.	
Day 2 July 6, 2011	Meeting with representatives of JSC "CS "Zvezdochka"	Meeting with representatives of relevant departments and its subordinate organizations of the Government of the Archangelsk Region. Meeting with representatives AMD EMERCOM.
Day 3 July 7, 2011	Meeting with representatives of JSC "PA "SEVMASH"	Meeting with representatives of ARSA "Centre to ensure activities of civil protection of the Archangelsk

		Region", ARSA "Rescue Service".
Day 4 July 8, 2011	Meeting with representatives of JSC «NIPTB Onega» and Severodvinsk Municipality	Meeting with representatives of the Northern ROSHYDROMET, CHEM-R.
Day 5 July 11, 2011	Meeting with FSUE «Krylov CNII» and IBRAE RAN	Meeting with representatives of AMB ROSPOTREBNADZOR, FMBA, medical organizations, ROSTECHNADZOR
Day 6 July 12, 2011	Meeting with representatives of ROSATOM, MINPROMTORG, and the Government of the Archangelsk region. Familiarization with the plan of exercises	
Day 7 July 13, 2011	Participation as observers in comprehensive emergency response exercises.	
Day 8 July 14, 2011	Summary of the mission activity, summary of exercises. **Final meeting**: IAEA team and the Host side discuss the report preparation and the results of the mission activity.	

Documents
The Host side will make available to the mission laws or decrees as well as International Law Instruments adhered to by the country (if possible in English; IAEA could provide for the translation costs) relative to radiation safety.

The IAEA will provide the Host country with relevant safety standards and guidelines (also available on IAEA homepage):

- Arrangements technology for response to a nuclear or radiological emergency, IAEA, Vienna 2003 (EPR METHOD);

- Preparedness and Response to a Nuclear or Radiological Emergency, IAEA, Vienna, 2002 (GS-R-2).

The final report on the mission activity is to be passed over to ROSATOM, the Government of the Archangelsk Region and IBRAE RAN.

Briefing Pack for EPREV Team

Document	Responsible party
List of legislation in the area of emergency preparedness and response	Host
List and description of individual organizations taking part in the emergency preparedness and response	Host
Nuclear Country Profile	IAEA
General Country Profile	IAEA
List of customs, holidays, working days	Host

Documents are to be handed over to IAEA coordinator one month before the EPREV mission.

Report confidentiality
Treatment of confidential information during the mission in the Archangelsk Region must be in accordance with the rules and regulations of the Russian Federation.

All the technical notes or other information that identify vulnerabilities will be treated as confidential information according to the Agency confidentiality regime.

APPENDIX IV. COMPREHENSIVE EMERGENCY EXERCISE "ARCTIC-2011"

Subject of the exercise
Organization of operation of territorial RSES subsystem of the Archangelsk Region and the facility emergency response system of JSC "CS "Zvezdochka" in case of a radiological emergency.

Scenario of the exercise
The exercise is based on the scenario of a criticality accident during the unloading of SNF from a reactor with a radionuclide release, along with steam-air mixture during operations on the SNF unloading at JSC "CS "Zvezdochka". The conditional accident took place at 10:00 13 July 2011 during work on dismantling the port reactor lid of a floating NPS which was supposed to be decommissioned and was made a technical berth at JSC "CS "Zvezdochka". Two workers were injured.

The explosion was followed by a release of radionuclides with a steam-air mixture. The release (fission products and trans-uranium elements remaining in the SNF, as well as inert radioactive gases (IRG) and iodine radionuclides, produced in a criticality) was carried by a cloud of overheated steam that rose to approximately 200 m. It is assumed that all the radionuclides except the IRG fall out from this cloud concentrated as moisture (water drops) and solid particles of various sizes.

Source term of release:

Fission products	1,6E+12 Bq
Trans-uranium elements	1,0E+08 Bq
Iodine (in aerosol form)	1,6E+12 Bq
IRG	2,0E+14 Bq

It was assumed in the calculations that a significant part of aerosols with the dimensions over 150 μm (approximately 10% of the total activity in the release) fell out close to the accident location, forming an area of local elevated contamination of approximately 300 m^2 of the technical berth of JSC "CS "Zvezdochka".

The remaining part of the release is transported in the ESE direction (wind direction WNW) with a speed of 3 m/s, atmosphere stability category C and effective cloud height of 200 m. Some territories of JSC "PA "SEVMASH" and Severodvinsk close to the emergency site could be contaminated due to the deposition of radioactive material from the cloud.

Objectives of the exercise:

- verification of preparedness of radiological emergency response forces and resources at facility, territorial and federal levels;
- verification of preparedness of notification and information exchange systems;
- testing the emergency plans and decision-making procedures at the facility level (JSC "CS "Zvezdochka"), municipal and territorial levels;
- enhancing interaction of the management, forces and resources in the process of mitigation of the consequences of the radiological emergency situations at the federal,

branch, territorial and municipal levels;

- verification of the application of procedures for information exchange with the international organizations.

Tasks of the exercise

- training the procedures of notification at the facility, local, federal and international levels;
- testing the communication and notification systems;
- testing the procedures of exchange of information on the radiation situation between the participants of the emergency response system;
- practicing the application of the procedures of a situation assessment and forecasting;
- practicing the application of the decision-making procedures, including engagement of the emergency plans;
- identifying the interaction procedures between the participants of the emergency response;
- practicing the application of decision-making procedures and practical actions on the population and personnel protection measures (evacuation, sheltering);
- identifying the regulations on working with the emergency nuclear installation aimed at bringing it to a safe condition;
- forecasting intermediate and long-term consequences of the accident;
- testing communication with FSUE "SCC of ROSATOM" on notification of IAEA and foreign countries;
- application of the public communication procedures;
- checking the preparedness of the forces and resources of JSC "CS "Zvezdochka", JSC "PA "SEVMASH", EMERCOM of Russia, municipal RSES unit of Severodvinsk, the Government of the Archangelsk Region, IBRAE RAN, FSUE «Krylov CNII», EMRDC, ROSHYDROMET, other territorial executive authorities (Northern ROSHYDROMET, AMD EMERCOM, AMB ROSPOTREBNADZOR, ANB ROSTECHNADZOR, RD58 FMBA, Ministry of the Interior, etc.) in responding to and mitigation of radiological emergencies;
- assessment of the time required for the deployment of the forces and resources required for emergency localization and mitigation, organization of interaction and coordination of work;
- assessment of the efficiency and adequacy of communication at all stages and levels in the management of an emergency situation;
- assessment of timeliness and credibility of the radiation situation monitoring, surveillance and forecasts in an emergency situation;
- assessment of the adequacy of regulatory documents for response to and management of an emergency situation of a given scale;

The exercise includes response at all levels from the facility to national.

Facility level of response

1. JSC “CS “Zvezdochka” site:
   - Joint LCC of JSC “CS “Zvezdochka” and JSC «NIPTB Onega»;
   - on-site radiation survey team;
   - on-site emergency rescue team;
   - on-site personnel sanitary treatment team;
   - on-site sanitary treatment of the Emergency Rescue Team personnel;
   - on-site territory decontamination team;
   - on-site vehicle decontamination team;
   - Mobile Radiometric Laboratory (MRL).
2. JSC ”PA “SEVMASH” site:
   - LCC of JSC ”PA “SEVMASH”;
   - MRL.

Municipal (local) level of response

3. City of Severodvinsk:
   - SC at the Administration of Severodvinsk, Commission on Emergency Situations and Fire Safety of Severodvinsk;
   - Unified On-duty Dispatcher Service (UODS) of Severodvinsk;
   - population assembly and evacuation site;
   - sanitary treatment checkpoint;
   - organizations of FMBA of Russia.

Regional level of response

4. City of Archangelsk:
   - CESF of the administration of the Archangelsk Region;
   - SC of the Government of the Archangelsk Region;
   - CSMC AMD EMERCOM of Russia in the Archangelsk Region;
   - AMD EMERCOM of Russia in the Archangelsk Region;
   - CHEM-R ROSHYDROMET;
   - State Public Institution of the Archangelsk Region "Centre for ensuring civil protection activities";
   - State budgetary institution of the Archangelsk Region "Rescue service";
   - AMB ROSPOTREBNADZOR;
   - ANB ROSTECHNADZOR;
   - UODS of Archangelsk Region.

National level of response

5. Moscow:
   - NCSMC (EMERCOM of Russia);
   - DNRS of SK “ROSATOM”;
   - FSUE “SCC ROSATOM”;
   - TCC IBRAE RAN;
   - EMRDC of Burnazyan FMBC, FMBA of Russia.
6. Obninsk, the Kaluga Region:
   - Typhoon (ROSHYDROMET).
7. St-Petersburg:
   - TCC of FSUE «Krylov CNII» (MINPROMTORG).
8. Murmansk:
   - Centre of monitoring and forecasting of State Regional Agency for Civil Defense, Emergency Situations and Fire Safety the Murmansk Region.

GLOSSARY

arrangements (for emergency response): The integrated set of infrastructure elements necessary to provide the capability for performing a specified function or task required in response to a nuclear or radiological emergency. These elements may include authorities and responsibilities, organization, coordination, personnel, plans, procedures, facilities, equipment or training.

dangerous source: A source that could, if not under control, give rise to exposure sufficient to cause severe deterministic health effects. This categorization is used for determining the need for emergency response arrangements and is not to be confused with categorizations of sources for other purposes.

deterministic effect: A health effect of radiation for which a threshold level of dose generally exists above which the severity of the effect is greater for a higher dose. Such an effect is described as a 'severe deterministic effect' if it is fatal or life threatening or results in a permanent injury that reduces quality of life.

emergency: A non-routine situation or event that necessitates prompt action primarily to mitigate a hazard or adverse consequences for human health and safety, quality of life, property or the environment. This includes nuclear or radiological emergencies and conventional emergencies such as fires, release of hazardous chemicals, storms or earthquakes. It includes situations for which prompt action is warranted to mitigate the effects of a perceived hazard.

emergency action level (EAL): A specific, predetermined, observable criterion used to detect, recognize and determine the emergency class.

emergency class: A set of conditions that warrant a similar immediate emergency response. The term used for communicating to the response organizations and the public the level of response needed. The events that belong to a given emergency class are defined by criteria specific to the installation, source or practice, which if, exceeded indicate classification at the prescribed level. For each emergency class, the initial actions of the response organizations are predefined.

emergency classification: The process whereby an authorized official classifies an emergency in order to declare the applicable level of emergency class. Upon declaration of the emergency class, the response organizations initiate the predefined response actions for that emergency class.

emergency plan: A description of the objectives, policy and concept of operations for the response to an emergency and of the structure, authorities and responsibilities for a systematic, co-coordinated and effective response. The emergency plan serves as the basis for the development of other plans, procedures and checklists.

(emergency) preparedness: The capability to take action that will effectively mitigate the consequences of an emergency for human health, safety, quality of life, property and the environment.

emergency procedures: A set of instructions describing in detail actions to be taken by response personnel in an emergency.

(emergency) response: The performance of actions to mitigate the consequences of an emergency on human health and safety, quality of life, property and the environment. It may also provide a basis for the resumption of normal social and economic activity.

emergency services: The local off-site response organizations that are generally available and that perform emergency response functions. These may include police, fire and rescue brigades, ambulance services, and control teams for hazardous materials.

emergency worker: A worker who may be exposed in excess of occupational dose limits while performing actions to mitigate the consequences of an emergency for human health and safety, quality of life, property and the environment.

emergency zones: The precautionary action zone and/or urgent protective action planning zone.

exposure: The act or condition of being subject to irradiation. Exposure can be either external exposure (irradiation by sources outside the body) or internal exposure (due to a source within the body).

first responders: The first members of an emergency service to respond at the scene of an emergency.

generic intervention level: The level of avertable dose at which a specific protective action is taken in an emergency or situation of chronic exposure.

generic action level: The concentration (Bq/g) of specific isotopes in food or water at which consumption should be restricted if replacement food or water is available.

initial phase: The period of time from the detection of conditions warranting the implementation of response actions that must be taken promptly in order to be effective until those actions have been completed. These actions include taking mitigatory actions by the operator and urgent protective actions on- and off-site.

intervention: Any action intended to reduce or avert exposure or the likelihood of exposure to sources which are not part of a controlled practice or which are out of control as a consequence of an accident.

intervention level: The level of avertable dose at which a specific protective action is taken in an emergency or situation of chronic exposure.

longer term protective action: A protective action, which is not an urgent protective action. Such protective actions are likely to be prolonged over weeks, months or years. These include measures such as relocation, agricultural countermeasures and remedial actions.

non-radiological consequences: Effects on humans or the environment that are not deterministic or stochastic effects. These include effects on health or the quality of life resulting from psychological, social or economic consequences of the emergency or the response to the emergency.

notification:

1. A report submitted to a national or international authority providing details of an emergency or potential emergency, for example as required by the Convention on Early Notification of a Nuclear Accident;
2. A set of actions taken upon detection of emergency conditions with the purpose of alerting all organizations with responsibility for taking emergency response actions in the event of such conditions.

notification point: A designated organization with which arrangements have been made to receive notification (see *notification, 2.*) and to promptly initiate predetermined actions to activate part of the emergency response.

nuclear or radiological emergency: An emergency in which there is, or is perceived to be a hazard due to:

- The energy resulting from a nuclear chain reaction or from the decay of the products of a chain reaction; or
- Radiation exposure.

off-site: Outside the site area.

on-site: Within the site area.

operational intervention level (OIL): A calculated level, measured by instruments or determined by laboratory analysis that corresponds to an intervention or action level. OILs are typically expressed in terms of dose rates or activity of radioactive material released, time integrated air concentrations, ground or surface concentrations, or activity concentrations of radionuclides in environmental, food or water samples. An OIL is a type of action level that is used immediately and directly (without further assessment) to determine the appropriate protective actions on the basis of an environmental measurement.

operator (or operating organization): Any organization or person applying for authorization or authorized and/or responsible for nuclear, radiation, radioactive waste or transport safety when undertaking activities or in relation to any nuclear facilities or sources of ionizing radiation. This includes private individuals, governmental bodies, consignors or carriers, licensees, hospitals, and self-employed persons. This also includes those who are either directly in control of a facility or an activity during use (such as radiographers or carriers) or, in the case of a source not under control (such as a lost or illicitly removed or a re-entering satellite), those who were responsible for the source before control was lost over it

practice: Any human activity that introduces additional sources of exposure or exposure pathways or extends exposure to additional people or modifies the network of exposure pathways from existing sources, so as to increase the exposure or the likelihood of exposure of people or the number of people exposed.

precautionary action zone: An area around a facility for which arrangements have been made to take urgent protective actions in the event of a nuclear or radiological emergency to reduce the risk of severe deterministic health effects off-site. Protective actions within this area are to be taken before or shortly after a release of radioactive material or exposure on the basis of the prevailing conditions at the facility (EALs).

protective action: An intervention intended to avoid or reduce doses to members of the public in emergencies or situations of chronic exposure.

radiation emergency: A nuclear or radiological emergency.

radiological emergency: An emergency involving an actual or perceived risk from activities that could give rise to a nuclear or radiological emergency at an unforeseeable location. These include non-authorized activities such as activities relating to dangerous sources obtained illicitly. They also include transport and authorized activities involving dangerous mobile sources such as industrial radiography sources, radio thermal generators or nuclear powered satellites.

radiological dispersal device (RDD): A device constructed by terrorists to spread radioactive materials using conventional explosives or other means.

regulatory body: An authority or system of authorities designated by the government of a State as having legal authority for conducting the regulatory process, including issuing authorizations and thereby regulating nuclear, radiation, radioactive waste and transport safety.

response organization: An organization designated or otherwise recognized by a State as being responsible for managing or implementing any aspect of a response.

significant transboundary release: A release of radioactive material to the environment that may result in doses or levels of contamination beyond national borders from the release which exceed international intervention levels or action levels for protective actions, including food restrictions and restrictions on commerce.

site area: A geographical area that contains an authorized facility, activity or source, within which the management of the authorized facility or activity may directly initiate emergency actions. This is typically the area within the security perimeter fence or other designated property marker. It may also be the controlled area around a radiography source or a cordoned off area established by first responders around a suspected hazard.

source: Anything that may cause radiation exposure — such as by emitting ionizing radiation or by releasing radioactive substances or materials — and can be treated as a single entity for protection and safety purposes. For example, materials emitting radon are sources in the environment, a sterilization gamma irradiation unit is a source for the practice of radiation preservation of food, an X-ray unit may be a source for the practice of radio diagnosis; a nuclear power plant is part of the practice of generating electricity by nuclear fission, and may be regarded as a source (e.g. with respect to discharges to the environment) or as a collection of sources (e.g. for occupational radiation protection purposes). A complex or multiple installation situated at one location or site may, as appropriate, be considered a single source for the purpose of application of international safety standards.

stochastic effect (of radiation): A radiation induced health effect, where the probability of occurrence is greater from a higher radiation dose and the severity of which (if it occurs) is independent of dose. Stochastic effects may be somatic effects or hereditary effects, and generally occur without a threshold level of dose. Examples include thyroid cancer and leukaemia.

threat assessment: The process of systematically analyzing hazards associated with facilities, activities or sources within or beyond the borders of a State in order to identify:

1. Those events and associated areas for which protective actions and emergency countermeasures may be required within the State; and
2. The actions that would be effective in mitigating the consequences of such events.

transnational emergency: A nuclear or radiological emergency of actual, potential or perceived radiological significance for more than one State. This includes:

1. A significant transboundary release of radioactive material (however a transnational emergency dose not necessarily imply a significant transboundary release or radioactive material);
2. A general emergency at a facility or other event that could result in a significant transboundary release (atmospheric or aquatic) of radioactive material;
3. A discovery of loss or illicit removal of a dangerous source that has been transported across or is suspected of having been transported across a national border;
4. An emergency resulting in significant disruption to international trade or travel;

5. An emergency warranting the taking of protective actions for foreign nationals or embassies in the State in which it occurs;
6. An emergency resulting in or potentially resulting in severe deterministic health effects and involving a fault and/or problem (such as in equipment or software) that could have implications for safety internationally;
7. An emergency resulting in or potentially resulting in great concern among the population of more than one State owing to the actual or perceived radiological hazard.

urgent protective action: A protective action that, in the event of an emergency, must be taken promptly (normally within hours) in order to be effective, and the effectiveness of which will be markedly reduced if it is delayed. The most commonly considered urgent protective actions in a nuclear or radiological emergency are evacuation, decontamination of individuals, sheltering, respiratory protection, iodine prophylaxis, and restriction of the consumption of potentially contaminated foodstuffs.

urgent protective action planning zone: An area around a facility for which arrangements have been made to take urgent protective actions in the event of a nuclear or radiological emergency to avert doses off-site in accordance with international standards. Protective actions within this area are to be taken on the basis of environmental monitoring — or, as appropriate, prevailing conditions at the facility.

ABBREVIATIONS

AMB ROSPOTREBNADZOR	Archangelsk Main Branch of ROSPOTREBNADZOR, Archangelsk
AMD EMERCOM	Archangelsk Main Department of EMERCOM, Archangelsk
ANB ROSTECHNADZOR	Archangelsk-Nenetsk Division for inspection of radiation hazardous facilities of North-European interregional territorial department on the control of nuclear and radiation safety of ROSTECHNADZOR, Archangelsk
ARMS	Automated Radiation Monitoring System
ARSA	Archangelsk Regional State Agency
CESF-AR	Commission for prevention and mitigation of emergency situations and fire safety of Archangelsk Region
CESFS	Commission for Prevention and Mitigation of Emergency Situations and Fire Safety
CHE58 FMBA	Centre of Hygiene and Epidemiology No. 58 of FMBA
CHEM-R ROSHYDROMET	Centre for monitoring of environmental pollution of the State Institution «Archangelsk Centre on Hydrometeorology and Environmental Monitoring with the Regional Functions», of ROSHYDROMET, Archangelsk
CMSU58 FMBA	Central Medical Sanitary Unit No. 58 of FMBA
JSC “CS “Zvezdochka”	Joint-Stock Company "Centre of Shiprepairing "Zvezdochka" (OAO "Tsentr Sudoremonta "Zvezdochka"), Severodvinsk (http://www.star.ru/)
CSMC AMD EMERCOM	State Agency "Crisis Situation Management Centre" of the AMD EMERCOM, Archangelsk
DNRS ROSATOM	Department of Nuclear and Radiation Safety, Organization of Licensing and Permitting Activity of ROSATOM, Moscow
EBRD	European Bank for Reconstruction and Development, London, UK
EMERCOM	Ministry of Civil Defence, Emergencies and Disaster Relief of the Russian Federation, Moscow
EMRDC FMBA	Emergency Medical Radiation and Dosimetry Centre of "A.I. Burnazyan Federal Medical and Biophysical Centre" of FMBA, Moscow
EPR AC	Emergency Preparedness and Response Group of the Arctic Council
EPREV	Emergency Preparedness Review
ESAC IBRAE RAN	Autonomous Non-commercial Organization Energy Safety Analysis Centre of IBRAE RAN, Moscow
FMBA	Federal Medical and Biological Agency of the Russian Federation, Moscow
IAEA	International Atomic Energy Agency, Vienna, Austria
IBRAE RAN	Nuclear Safety Institute of Russian Academy of Sciences (Institut Problem Bezopasnogo Razvitiya Atomnoy Energetiki Rossiskoy Akademii Nauk), Moscow
IRG	Inert Radioactive Gases
JSC	Joint Stock Company
LCC	Local Crisis Centre
LCC	Local Crisis Centre

MINPROMTORG	Ministry of Industry and Trade of the Russian Federation, Moscow
MRL	Mobile Radiometric Laboratory
NCSMC EMERCOM	National Crisis Situation Management Centre of EMERCOM of the Russian Federation, Moscow
NDEP	Northern Dimension Environmental Partnership Support Fund
NDEP-008	NDEP Project No 8 "Enhancement of Radiation Monitoring and Emergency Response System in the Archangelsk Region"
JSC «NIPTB Onega»	Joint-Stock Company "Research and Development Technological Bureau "Onega" (OAO "Nauchno Issledovatelskoe Proizvodstvenno-Tehnologicheskoe Byuro "Onega"), Severodvinsk (http://onegastar.ru/)
Northern ROSHYDROMET	Northern Interregional Territorial Department of ROSHYDROMET, Archangelsk
NPP	Nuclear Power Plant
NPS	Nuclear Powered Submarine
NRB-99/2009	Radiation Safety Norms of the Russian Federation NRB-99/2009
NWB IBRAE RAN	Northwest branch of IBRAE RAN, Severodvinsk
OIL	Operational Intervention Level
JSC ”PA “SEVMASH”	Joint Stock Company "Production Association "Northern machine – building enterprise" (OAO "Proizvodstvennoe Ob'yedineniye "SEVERNOE MASHINOSTROITELNOE PREDPRIYATIE"), Severodvinsk (http://www.sevmash.ru/eng/)
RD58 FMBA	Federal State Health Agency "Regional Department No. 58 of FMBA"
RF	The Russian Federation
ROSATOM	State Atomic Energy Corporation "Rosatom", Moscow (http://www.rosatom.ru/)
ROSHYDROMET	Federal Service for Hydrometeorology and Environmental Monitoring of the Russian Federation, Moscow
ROSPOTREBNADZOR	Federal Service on Customers' Rights Protection and Human Well-being Surveillance of the Russian Federation, Moscow
ROSTECHNADZOR	Federal Environmental, Industrial and Nuclear Supervision Service of the Russian Federation, Moscow
RSES	Russian Unified State System for Prevention and Liquidation of Emergency Situations
RW	Radioactive Waste
SC	Situation Centre
SCC ROSATOM	Federal State Unitary Enterprise "Situation Crisis Centre of ROSATOM", Moscow
SNF	Spent Nuclear Fuel
SPZ	Sanitary Protection Zone
FSUE «Krylov CNII»	"Krylov Shipbuilding Research Institute" (Federal State Unitary Enterprise "Tsentralnyy nauchno-issledovatelskiy institut imeni akademika A.N. Krylova"), St-Petersburg (http://www.krylov.com.ru/eng1/main.htm)
TCC	Technical Crisis Centre
TCC IBRAE RAN	Technical Crisis Centre of IBRAE RAN, Moscow

Typhoon	Scientific Production Association «Typhoon» of ROSHYDROMET, Obninsk
UODS	Unified On-duty Dispatcher Service

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