NORWM
ROSATOM

FSUE “National Operator for Radioactive Waste Management”

REPORT

on enviromental safety for 2022

MOSCOW 2023

CONTENTS

INTRODUCTION

Environmental Safety Report of the Federal State Unitary Enterprise "National Operator for Radioactive Waste Management" (NORWM, FSUE) for the year 2022 (hereinafter referred to as the Report) is the tenth annual environmental report prepared on the basis of the Unified Industry Environmental Policy of ROSATOM and its organizations, approved by Order of ROSATOM of 05.12.2017 No. 1/1232-P (as amended by order of ROSATOM State Corporation of 29.11.2021 No. 1/1553-P), and in accordance with the Plan for the Implementation of the Environmental Policy of FSUE “NORWM” and its branches for the year 2022 and for the period up to 2024, approved by order of FSUE “NORWM” of 29.11.2021 No. 319-01/1025-P (in the version of the order of FSUE “NORWM” dated 24.11.2022 No. 319-01/1219-P) and addressed to a wide range of concert parties.

The Report provides information on the environmental condition in the regions of the Federal State Unitary Enterprise "National Operator for Radioactive Waste Management" FSUE "NORWM" presence, including the impact on natural sites, information about ongoing measures in the field of environmental protection and ecological safety.

During 2022 NORWM carried out activities to ensure environmental safety and environmental protection. Violations of regulatory legal acts in the field of environmental protection and environmental safety were not allowed.

NORWM’s impact of on the environmental objects does not exceed the permissible values established by the licenses and law as well as in previous years.

In the Report are furthermore demonstrated images and short summary information about the Russian habitant birds species in accordance with the chosen theme for design and decoration.

BLACK-WINGED STILT

HIMANTOPUS HIMANTOPUS

Order: Charadriiformes

Family: Recurvirostridae

Rear species

BLACK-WINGED STILT

HIMANTOPUS HIMANTOPUS

THE BREEDING HABITAT IS SHALLOW RIVERS. BY LONG LEGS

THESE BIRDS PICK UP THEIR FOOD FROM WATER AND BED.

THESE BIRDS OFTEN NEST IN SMALL GROUPS

KRASNOYARSK REGION

1 GENERAL CHARACTERISTICS AND MAIN ACTIVITIES OF FSUE «NORWM»

1.1. General information

1.1.1. Organization's general characteristics description and its main activities

International practice acclaims final disposal of radioactive waste (hereinafter – RAW) in special facilities to be the most secure way to isolate it. The final disposal of RAW is the final, very important and environmentally responsible stage of RAW management, aimed at RAW isolation from human habitation environment, ensuring reliable long-term safety for the total duration of its potential danger.

The Federal State Unitary Enterprise "National Operator for Radioactive Waste Management" was created in accordance with the Federal Law № 190-FZ of July 11, 2011 "On management of radioactive waste and amendments to certain Russian Federation's legislative acts" at the premises of the state enterprise "Central Research Laboratory of Industrial Innovation Technologies", established by the Ministry of Atomic Energy and Industry of the USSR order of April 9, 1990 № 269.

By the Russian Federation's Government Executive Order of March 20, 2012 № 384-p, FSUE "NORWM" got the status of the only organization, authorized to dispose radioactive waste, performing a spectrum of associated activities.

The place of NORWM in the general process chain of the RAW management is shown in the Figure 1.

disposal of RAW.

FSUE "NORWM" by the governing body represented by the State Atomic Corporation "Rosatom" is acclaimed as the organization authorized to operate nuclear facilities and conduct activities in the field of atomic energy use pursuant to the Certificate of March 07, 2012 № GK-S008, amended of November 13, 2017.

Figure.1. General scheme of RAW management

Providing solutions to the problems of the nuclear legacy and newly-produced RAW management, NORWM is a state production and environmental enterprise with the key goal of RAW final disposal, considering all the potential risks to our environment and human wellbeing.

The mission of NORWM is to ensure the environmental safety of the Russian Federation applicable to the final

The activities of NORWM in accordance with the Charter, are as follows:

- radioactive waste disposal;
- oensuring the safe handling of radioactive waste accepted for final disposal;
- ensuring the operation and closure of the final disposal facilities;
- ensuring nuclear, radiation, technical, fire safety, environmental protection;

- ensuring radiation control on the territory of RAW final disposal facilities including routine radiation surveillance after shutting the facilities down;
- execution the customer's functions in the designing and construction of RAW final disposal facilities, including engineering and survey works;
- forecasting RAW production volumes, developing RAW management infrastructure for and publishing relevant information on the NORWM website and the website of ROSATOM in the Internet;
- technical and information support of the Russian Federation's State system for accounting and control of radioactive substances and radioactive waste;
- information of the public, administrative authorities, various state bodies and local governments on the safety issues when handling RAW, and radiological environment at the territories of RAW disposal facilities presence;
- RAW inventory reconciliation at the disposal facilities;
- preparatory and pre-design works regarding construction of RAW disposal facilities;
- land property purchasing, construction-in-progress assets and equipment for the purposes of RAW disposal;
- designing, manufacturing and installation of the equipment for the purposes of RAW disposal;
- conducting research and development works to justify and increase the operational and closure safety of the disposal facilities;
- RAW storage of before its transfer to the disposal facilities;
- development and implementation of socially beneficial activities, aimed at the citizenry social safety net support, inclusive of health protection measures for the territorial domain residents living in the near vicinity of the RAW disposal facilities, taking into account regional socio-economic development programmes and environmental safety provisioning throughout Russian Federation regions hosting RAW disposal facilities;
- developing and implementing measures to ensure the physical protection of final disposal facilities, including the creation of a system and elements of a physical protection system;
- implementing measures on revealing locations for potential radioactive waste disposal facilities placement, involving social and marketing research, legal aspects analysis associated with potential placement of RAW disposal facility, implementation of Research and Advanced Technological Development along with the wide spectrum of geological and geodesic surveys, necessary for decision making on disposal facilities placement;
- public hearing management;

- ensuring confidential information security, classified as state secret and other data of restricted access in accordance with the Russian Federation legal and regulatory documents and local internal policies and procedures of ROSATOM;
- construction of RAW storage facilities.
- NORWM has the title to carry out other types of activities in accordance with the legislation of the Russian Federation

Nuclear materials, radioactive substances and RAW are subjected to the state accounting and control by the State Accounting and Control System for Nuclear Materials and by the State Accounting and Control System for Radioactive Substances and RAW according to the Federal Law No. 170-FZ of November 21, 1995 On Atomic Energy Use (Article 22). Technical and informational support for the State Accounting and Control System for Radioactive Substances and RAW is one of NORWM's key responsibilities.

The Governmental Decree of June 15, 2016 No. 542 On the Management of the State System for Accounting and Control of Radioactive Material and Radioactive Waste (as amended by Governmental Decree of October 19, 2021, No. 1774) establishes the RAW state accounting and control policy. The policy covers the procedures of RAW collection, amount and qualitative composition recording, transportation, registration, registration of storage facilities, maintaining RAW register, maintaining RAW storage facilities cadaster, RAW passport registration.

At present stage NORWM processes its work in two reference directions:

- operational activities;
- creating final disposal facilities for radioactive waste (pre-design works, project development and construction).

1.1.2. NORWM organizational structure

The enterprise consists of the Head office and a number of branches / filiations in the areas of RAW final disposal facilities location (operated, under construction and designed):

- **"Dimitrovgradskiy" filiation** (Dimitrovgrad city, Ulyanovsk region);
- **"Zheleznogorskiy" filiation** (Zheleznogorsk city, Krasnoyarsk region);
- **"Severskiy" filiation** (Seversk city, Tomsk region);
- **"Novouralskoe" subbranch of the "Severskiy" filiation** (Novouralsk city, Sverdlovsk region);
- **"Ozersky" filiation** (Ozersk city, Chelyabinsk region).

Figure 2. Location map of the operated, under constructed and designed RAW disposal facilities of NORWM

“Dimitrovgradskiy”, “Severskiy” and “Zheleznogorskiy” filiations are conducting the operations on deep disposal of liquid radioactive waste (LRW).

“Novouralskoe” subbranch of “Severskiy” filiation operates the near surface disposal facility (hereinafter –NSDF) for RAW of the 3-rd and 4-th classes.

“Ozersky” filiation was established in the end of 2017 for the purpose of construction and subsequent operation of NSDF for RAW of the 3-rd and 4-th classes.

Figure 3. Copies of Subsoil Use Licenses

NORWM carries out the following types of activities of the list of those, stipulated by the company's Charter, directly related to RAW management in the course of its final isolation, as well as ensuring radiation safety of NORWM’s personnel, population and environment, on the basis of (figure 3):

- licence of 26.11.2013 No. ULN 15637 ZE with annexation of 09.11.2021 No. 1, issued by the Federal Agency for Mineral Resources (hereinafter Rosnedra) for the using subsoil for the purpose of liquid low and intermediate-level RAW disposal at the landfill of the State Scientific Center - Scientific Research Institute of Atomic Reactors in Dimitrovgrad;

- licence of 26.11.2013 No. KRR 15638 ZG with annexation of 09.11.2021 No. 1, issued by Rosnedra for the subsoil use with the purpose of liquid RAW disposal in the Deep disposal facility at the "Severniy" landfill (Zheleznogorsk);

- licence of 26.11.2013 No. TOM 15636 ZG, with annexation of 19.05.2015 No. 1, issued by Rosnedra for the using of subsoil for the purpose of liquid RAW disposal in subsurface horizontal tanks at the “Severskiy” NORWM filiation;

- licence of 05.08.2015 No. GN-02-304-3058, as amended of 27.12.2017 No. 1, issued by the Federal Environmental, Industrial and Nuclear Supervision Service of Russia (hereinafter ROSTECHNADZOR) for the RAW storage facility construction in the “Novouralskoe” subbranch of the "Severskiy" NORWM filiation;
- licence of 10.11.2015 No. GN-03-304-3092, with annexation of 07.08.2017 No. 1 and annexation of 29.09.2021 No. 2, issued by ROSTECHNADZOR for the first stage of the on-site RAW disposal facility operation implemented by the “Novouralskoe” subbranch of the "Severskiy" NORWM filiation;
- licence of 21.03.2022 No. GN-03-304-4212, issued by ROSTECHNADZOR for operation of the RAW storage facility by the “Novouralskoe” subbranch of the "Severskiy" NORWM filiation;
- licence of 22.07.2016 No. KRR 16117 ZD, issued by Rosnedra for the subsoil use with the purpose of RAW disposal in the deep geological horizons at the Yenisei reach of Nizhnekanskiy rock massif;
- licence of 27.12.2016 No. GN-01,02-304-3318 issued by ROSTECHNADZOR on the deployment and construction of an underground research laboratory in Nizhnekanskiy rock massif (Zheleznogorsk – restricted administrative unit, Krasnoyarsk region);
- licence of 16.07.2018 No. GN-03-304-3539, as amended of 26.12.2018 No. 1, issued by ROSTECHNADZOR for the on-site RAW disposal facility and installations operation implemented by the “Dimitrovgradskiy” NORWM filiation;
- licence of 16.07.2018 No. GN-03-304-3538, with annexation of 26.12.2018 No. 1 and annexation of 05.06.2020 No. 2, issued by ROSTECHNADZOR on the RAW disposal facility operation implemented by the “Zheleznogorskiy” NORWM filiation;
- licence of 16.07.2018 No. GN-03-304-3540, as amended of 26.12.2018 No. 1, issued by ROSTECHNADZOR for the on-site RAW disposal facility and installations operation by the “Severskiy” NORWM filiation;

- licence of 22.06.2020 No. GN-(S)-01-304-3853, issued by ROSTECHNADZOR for the deployment and construction of a near-surface solid radioactive waste disposal facility for RAW of 3rd and 4th classes (Seversk – estricted administrative unit, Tomsk region);

- licence of 25.08.2020 No. GN-(S)-01-304-3914, as amended of 10.01.2023 No. 1, issued by t ROSTECHNADZOR for the deployment and construction of a near-surface solid radioactive waste disposal facility for RAW of 3rd and 4th classes (Ozersky municipality, Chelyabinsk region);

- licence of 13.04.2021 No. GN-(U)-02-304-4013, issued by ROSTECHNADZOR for the construction of RAW storages in terms of work performance and provision of services to operating companies.

1.2. 1.2. NORWM operational activity

1.2.1. Radioactive Waste of 5th class disposal

The disposal of liquid radioactive waste of 5th class is carried out in the deep underground repositories. These repositories are constituted of underground and above-ground installations designed for the liquid low and intermediate level RAW disposal into deep geological formations, isolated from the below and overlying aquifers.

Information on the NORWM filiations activity on the in the RAW of 5th class disposal is presented in the Table 1.

Table 1

Information on the NORWM filiations activity on the in the RAW of 5th class disposal				
Characteristics		Filiation		
		“Dimitrovgradskiy”	“Zheleznogorskiy”	“Severskiy”
	Landfill name	“Experimental-industrial landfill” deep disposal facility (hereinafter EIL DDF)	Landfill “Severniy” (DDF landfill “Severniy")	LRW DDF “18 and 18a grounds
	Location	Ulyanovsk region, 6 km to south-west of Dimitrovgrad, at the territory of JSC «SSC RIAR» industrial site	Krasnoyarsk region, 60 km from Krasnoyarsk, 18 km from Zheleznogorsk. Within limits of FSUE MCC sanitary protection area	Tomsk region, 10 km from Tomsk city, 2,5 km from Seversk city living area at the territory of SCC JSC industrial site
	Year built	1966	1967	1963

Table 1

	Disposed waste type	LRW, categorized as 5-th class in accordance with disposed RAW classification pursuant to the Russian Federation Governmental Decree of 19.10.2012 No. 1069 (RAW of low and intermediate level)		
	Waste allocation (horizons depth)	Deep-seated collector formations, isolated from below and above aquifers. For RAW allocation the following horizons are used:		
		IHorizon III – at depth of 1419 – 1514 m, Horizon IV – at depth of 1114 – 1342 m	Horizon I – at depth of 355 – 500 m, Horizon II – at depth of 180 – 280 m	Site 18: Horizon II – at depth of 375–430 m Horizon III – at depth of 260–303 m Site 18a: Horizon II – at depth of 315 – 345 m
	Number of wells	28 observation; 4 injection	148 observation; 12 injection	212 observation; 15 injection
	Claim area	15 455 ha	4490 ha	10 970 ha
	Potential radioactive hazard category (in accordance with Principal Sanitary Radiation Safety Rules OSPORB-99/2009 requirements)	Category III (impact in case of emergency shall be limited to site territory; the border of sanitary-protection area conforms with that of industrial site)	Category II (impact in case of emergency is possible at the territory of sanitary-protection area and measures might be required for impact mitigation)	Category III (impact in case of emergency shall be limited to site territory; the border of sanitary-protection area conforms with that of industrial site)

The technological process of injection eliminates the possibility of negative impact on the environment component and the population. There were no emergencies leading to radiation impact on the environment and local population in all the time of operation.

Systematic control over the RAW distribution, that should be fixed within the predetermined geological environmental boundaries of the with specialized studies conduction, via the network of observational and test wells accompanies the LRW disposal process.

Periodic servicing, concept maintenance and control of the equipment condition, and conducted works quality inspection are carried out at DDF constantly. Maintenance of LRW DDF is carried out throughout the day and night.

1.2.2. . Disposal of radioactive waste of 3rd and 4th classes

"Novouralskoe" subbranch of "Severskiy" filiation operates a near-surface disposal facility (NSDF) for radioactive waste in Novouralsk city.

Establishing and constructing the facility in Novouralsk, Sverdlovsk region was provided for by the federal target programme "Nuclear and Radiation Safety in 2008 and for the period up to 2015" (hereinafter – FTP). The NSDF was constructed in accordance with the project design developed by the Ural Design and Research Institute "VNIPIET". The operation of the NSDF began in November 2016, when the first batch of solid radioactive waste of class 3 was accepted from JSC UECC.

The NSDF is located in the industrial zone of Novouralsk, at the industry-purposed area, to the north of the residential area. The nearest settlements:

- Novouralsk is 4 km to the south;
- Belorechka settlement is 4.5 km to the north;
- Verkh-Neyvinskiy settlement is 4.8 km south-east;
- Neivo-Rudyanka settlement is 5 km north-east.

The NSDF is intended for disposal of 3rd and 4th classes of RAW according to the classification of the RAW, approved by the Government Decree of the Russian Federation dated October 19, 2012, No.1069.

The NSDF consists of repositories (unit No.10, storing units No. 11 – 13) for RAW disposal, building No.1, No. 16 and other installations.

The NSDF safety is provided by successive implementation of in-depth multi-barrier protection principles, based on physical barrier system standing on the way of ionizing radiation and radioactive substances transmission into the environment; safety is also provided by the use of the system of technical and organizational procedures for physical barriers protection and capacity retention as well as protection measures of the employees (personnel), population and environment.

1.3. Activities to create the final disposal facilities for radioactive waste

Clause 4 of the Government Decree of the Russian Federation dated November 19, 2012, No.1185 "On establishing process and timeframe for creation of the unified state system for radioactive waste management" provides for the creation of a system of final disposal facilities for radioactive waste.

One of the most important aspects of minimizing the negative impact on the environment and preventing environmental and radiation risks, as well as a crucial step in the process of creating final disposal facilities, is the pre-design stage, where prospective sites are determined and selected.

The basic principles for the placement of such facilities are shown in Figure 4.

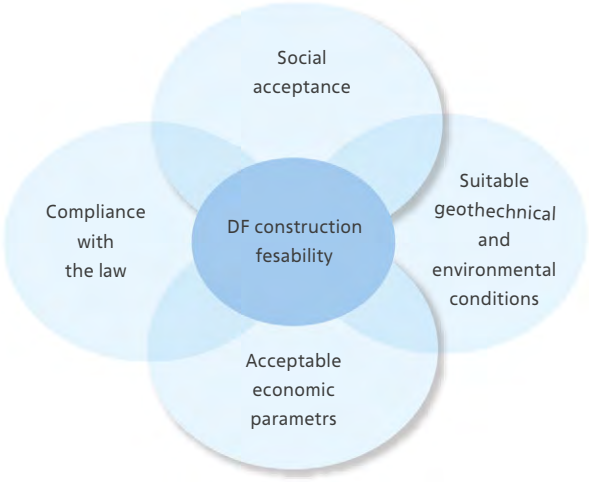


Figure. 4. Basic principles of the RAW disposal facilities placement

Only the assembly of mentioned above conditions makes possible considering a site as suitable for RAW disposal facility placement.

At the pre-design and design project stages, a major task is to conduct an environmental impact assessment (hereinafter – EIA), which is the crucial point for the safety of not only the facility itself, but also of the region of its location.

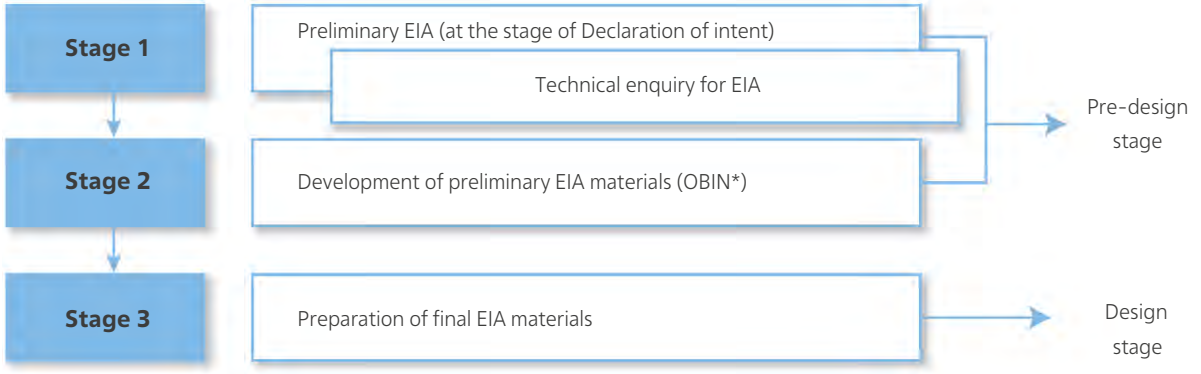
EIA is carried out in several stages (shown in Figure 5) in accordance with the Order of the Ministry of Natural Resources of the Russian Federation No. 999 "On environmental impact assessment requirements", dated December 01, 2020.

1.3.1. Construction of an underground research laboratory in Krasnoyarsk region

The underground research laboratory (hereinafter – URL) is being created in Nizhnekanskiy massif, Krasnoyarsk region for RAW of 1st and 2nd classes disposal.

More details about the URL project can be found on the website: **http://nkmlab.ru/**

In 2022 in the framework of the government contracts on construction and installation works at the site of "Facility (deep geological repository) for the disposal of the 1st and 2nd class radioactive waste (Krasnoyarsk region, Nizhnekanskiy massif)" were completed the construtions



*OBIN - investment case studies

Figure 5. EIA procedure

and installation works on the electrical substation with the capacity of 220/6kv, was installed the transmission network equipment, was performed the commissioning of metalclad substation, control lever and auxiliary switchboard systems.

On the side over the course of 2022 NORWM:

- completed the boosting station construction including works on equipment and boards termination, carried out the commissioning;
- roofed the fire station building;
- carried out the commissioning works, installed the facilities sealing chambers;
- installed the monolith coating, heat flow control layer and PVC windows of the administrative building;
- arranged the on-site water supply and sewerage networks;
- constructed the temporary structures and installations at the auxiliary shaft, conducted the preparatory works on the working collar for the start of mining works at the ventilation shaft.

The decision on creation of a deep geological RAW disposal facility willl be taken only after getting comprehensive long-term safety case confirmation based on the results of research made in the underground research laboratory.

1.3.2. Construction of NSDF for RAW of 3rd and 4th classes (Ozersk, Chelyabinsk region)

According to the licence of 25.08.2020 No. GN-(S)-01-304-3914 for placement and construction of near-surface disposal facility for solid radioactive waste of the 3rd and 4th classes in Ozersk, Chelyabinsk region, in 2022 NORWM conducted the arrangement of:

- grading and levelling operations;
- foundation frame, walls, floor slab of the incoming

control building with sanitary inspection room and shelter (building 1);

- foundation excavation, foundation, foundation beams, reinforced concrete columns, rafter beams, paving plates of heated parking for vehicles (building 5);
- foundation slab, walls of the transformer substation (structure 7), excavation work;
- foundation excavation, foundation, foundation beams, reinforced concrete columns, rafter beams, coating slabs of cold buffer material storage (structure 12);
- foundation excavation, installation of cope foundation for fueling up equipment (structure 10);
- foundation excavation, fallout monitoring station construction (structure 11);

- offsite utilities (power supply, water supply, sewerage, heat supply);
- clay storage areas;
- emergency water;
- surface effluent tanks;
- perimeter fencing.

The completed work volume of the preparatory period as of 31.12.2022 amounted to approximately 80%.

1.3.3. NSDF construction for RAW of the 3rd and 4th classes (Seversk, Tomsk region)

According to the received licence of 22.06.2020 No. GN-(S)-01-304-3853 for placement and construction of near-surface disposal facility for solid radioactive waste of the 3rd and 4th class in Seversk, Tomsk region, in 2022 NORWM conducted the arrangement of:

- temporary access road to the construction site;
- zero cycle for building 1 (ABK with shelter) with installation of foundation excavation, foundations, walls and shelter floor slab;
- section of offsite water supply networks;

- area of offsite wastewater discharge networks;
- section of offsite power supply networks;
- perimeter fence;
- package electrical substation with installation of foundations and grounding;
- on-site temporary roadways.

On the side, through 2022 the works on the construction of building 5 (parking) with installation of foundations, metal frame, roof, sandwich panel facade and building 6 (storage) with installation of foundations, metal frame, roof, and profiled facade were carried out. In 2022 NORWM also concluded the agreement on the project's design documentation adjustment..

BLACK STORK

CICONIA NIGRA

Order Ciconiiformes

Family Ciconiidae

Rear species

BLACK STORK

CICONIA NIGRA

IT NESTS IN THE CROWN OF TALL TREES

OR ON THE LEDGES OF ROCKS. THE SAME NEST CAN SERVE

SEVERAL GENERATIONS OF BIRDS FOR MANY YEARS. IT

LIVES IN SHALLOW WATERS, FLOOD MEADOWS

AND NEAR RESERVOIRS

CHELYABINSK REGION

2 NORWM ENVIRONMENTAL POLICY

2.1. NORWM environmental policy realization concept

NORWM is an environmentally significant organization of the nuclear industry in accordance with the ROSATOM list of environmentally significant organizations, approved on April 18, 2022.

To ensure the implementation of the ROSATOM and its organizations Unified Industry Environmental Policy provisions (approved by order of December 5, 2017 No.1/1232-P, as amended of November 29, 2021 No. 1/1553-P) NORWM updated its inhouse Environmental Policy by the order of April 18, 2022 No. 319-01/363-P.

When planning and carrying out its main activities, NORWM is guided by the following principles:

1. Principle of compliance

Ensuring the compliance of NORWM activities with the Russian Federation's legislative and other regulatory requirements in the field of environmental safety and protection along with the international substitutes in this area in force at the territory of Russia.

2. Principle of potential environmental hazard presumption

Awareness that any enterprise's activity may lead to a negative impact on the environment and the priority mandatory of environmental factors consideration and assessing of the whole possible spectrum of negative impact on the environment while planning and carrying out NORWM activities.

3. Principle of decisions scientific validity

Scientifically based approach to making environmentally significant decisions of NORWM's management and officials involving the expert community, as well as commitment of applying in our work state-of-the-art scientific achievements.

4. Precautionary principle

In the event of environment harm threat the lack of scientific validity of this threat assumptions should not be used as a reason to postpone implementation of cost-effective measures, aimed at preventing natural systems deterioration.

5. Consistency principle

Combination of environmental, economic and social interests of NORWM, community, public organizations, state authorities and local governments in the regions of NORWM filiation presence for sustainable development, providing favorable environment and ecological safety.

6. Environmental efficiency principle

Enhancement of environmental activities effectiveness, reduction of the NORWM environmental impact, natural resources utilization only at a reasonable expenditure level.

7. Information transparency principle

Is building of a constructive and open dialogue with the respect of the stakeholders rights and interests; urge of maintaining a balance of all stakeholders interests when making decisions affecting the environment or ensuring environmental safety; public right compliance on receiving reliable information about the environment state in the regions of NORWM presence; transparency and availability of information on the state of the environment.

8. Readiness principle

Constant readiness of NORWM management and employees to preventing, localization, and elimination of possible technological accidents or emergency situations consequences.

9. Acceptable risk principle

Compliance with NORWM's risk preparedness established order relative to public health, occupational health, industrial safety, and environmental protection; application of a risk-oriented approach making environmentally effective management solutions.

10. Continuous improvement principle

Continual improvement of safety and environmental management systems through the use of target values and eco-efficiency indicators.

11. Best practice principle

Using of the advanced domestic and foreign experience for improving environmental quality, ensuring environmental safety; introducing the best available efficient innovative and environmentally safe technologies.

2.2. NORWM environmental policy implementation obligations

To implement the basic principles of environmental activities, NORWM undertakes the following obligations:

2.2.1. to conduct predictive assessment of the RAW disposal environmental impact in order of risk reduction and accident prevention.

2.2.2. to implement measures aimed

- at the emissions and discharges of the environment pollutants indicators reduction,
- to the waste generation volume reduction, including RAW
- to the increasing the of disposed waste share of all hazard classes, including through the development of closed fuel cycle technologies.

2.2.3. to ensure water resources rational use.

2.2.4. to ensure environmental efficiency of management decisions by using criteria and indicators of environmental efficiency.

2.2.5. To implement and maintain best environmental management and safety practices in accordance with the national and international standards in this field.

2.2.6. To implement and apply in NORWM best available technologies (BAT) – safe innovative environmentally efficient technologies in the field of RAW disposal.

2.2.7. To provide environmental protection and safety activity with the necessary resources including personnel, financial and technological.

2.2.8. To improve the industrial environmental control and monitoring system, apply modern methods and measurement tools to develop automated systems of environmental control and monitoring; carry out the measurements within the framework of the quality control system operation.

2.2.9. To involve interested individuals, stakeholders, representatives and speakers of public or non-profit organizations into discussion of projected activities on the matter of RAW disposal field in the scope of environmental protection and safety issues, in accordance with the established procedure.

2.2.10. To ensure interaction and coordination of activities in the field of environmental protection and environmental safety with state authorities of the Russian Federation, state authorities of constituent entities of the Russian Federation and local self-government bodies.

2.2.11. To contribute to the creation of favorable conditions for maintaining the balance of natural ecosystems, preventing their loss and/or degradation in areas of NORWM operation conduction by minimizing the impact on biodiversity and/or harm compensation, including the measures for the disturbed areas restoration, maintaining the landscape, vegetation cover and fauna habitats at the areas of NORWM filiation presence.

2.2.12. When choosing sites for the NSDF placement to consider the ban on the implementation of production activities within the boundaries of specially protected natural areas belonging to UNESCO World Heritage Sites.

2.2.13. To ensure informational credibility, accessibility, openness and reliability regarding the matters of NORWM environmental impact in the regions of its presence and measures taken to protect ambiance and environmental safety provision.

2.2.14. To promote the establishment of environmental culture and knowledge development among NORWM personnel along with ecological education through the regional communities of NORWM presence.

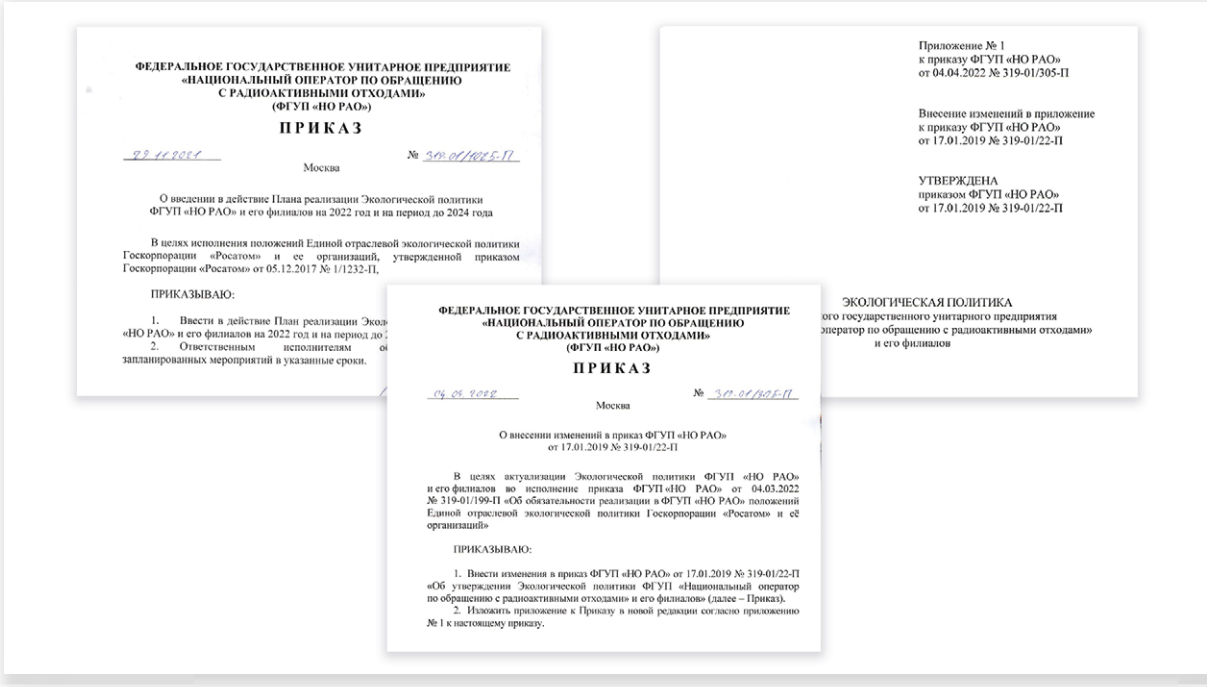
2.2.15. To strive to adopt the standard of environmental openness as a model for industrial and energy enterprises and other organizations in the Russian Federation.

2.3. Environmental Policy realization principles

NORWM implements its Environmental Policy consistently to the State Atomic Energy Corporation "Rosatom" and its subsidiaries Unified Industrial Environmental Policy provisions.

In order to implement NORWM Environmental Policy efficiently a three-year plan is developed, approved, and is being annually updated. A report is generated, basing on the plan implementation results. In 2021 the Environmental Policy implementation plan was developed for the 2022 – 2024 period. In 2022 the planned activities have been fully implemented.

RAW disposal is an effective environmental protection measure that prevents the population and the environment from its negative impact. Performing this activity, in accordance with the existing legal documentation, additional measures are taken to meet the requirements of sanitary, radiation and environmental safety. A sanitary protection zone and mineral block allocation are arranged there in order to ensure the waste localization. Verification of compliance with the requirements of sanitary and radiation safety systems for the final disposal of radioactive waste is carried out basing on monitoring, measuring and analysis of the results, performing of calculations and model investigations.



ФЕДЕРАЛЬНОЕ ГОСУДАРСТВЕННОЕ УНИТАРНОЕ ПРЕДПРИЯТИЕ
«НАЦИОНАЛЬНЫЙ ОПЕРАТОР ПО ОБРАЩЕНИЮ
С РАДИОАКТИВНЫМИ ОТХОДАМИ»
(ФГУП «НО РАО»)

ПРИКАЗ

Москва

О введении в действие Плана реализации Экологической политики ФГУП «НО РАО» и его филиалов на 2022 год и на период до 2024 года

В целях исполнения положений Единой отраслевой экологической политики Госкорпорации «Росатом» и ее организаций, утвержденной приказом Госкорпорации «Росатом» от 05.12.2017 № 1/1232-П,

ПРИКАЗЫВАЮ:

Приложение № 1
к приказу ФГУП «НО РАО»
от 04.04.2022 № 319-01/305-П

Внесение изменений в приложение
к приказу ФГУП «НО РАО»
от 17.01.2019 № 319-01/22-П

УТВЕРЖДЕНА
приказом ФГУП «НО РАО»
от 17.01.2019 № 319-01/22-П

ЭКОЛОГИЧЕСКАЯ ПОЛИТИКА
ого государственного унитарного предприятия
ператор по обращению с радиоактивными отходами»
и его филиалов

ФЕДЕРАЛЬНОЕ ГОСУДАРСТВЕННОЕ УНИТАРНОЕ ПРЕДПРИЯТИЕ
«НАЦИОНАЛЬНЫЙ ОПЕРАТОР ПО ОБРАЩЕНИЮ
С РАДИОАКТИВНЫМИ ОТХОДАМИ»
(ФГУП «НО РАО»)

ПРИКАЗ

Москва

О внесении изменений в приказ ФГУП «НО РАО»
от 17.01.2019 № 319-01/22-П

В целях актуализации Экологической политики ФГУП «НО РАО» и его филиалов во исполнение приказа ФГУП «НО РАО» от 04.03.2022 № 319-01/199-П «Об обязательности реализации в ФГУП «НО РАО» положений Единой отраслевой экологической политики Госкорпорации «Росатом» и её организаций»

ПРИКАЗЫВАЮ:

1. Внести изменения в приказ ФГУП «НО РАО» от 17.01.2019 № 319-01/22-П «Об утверждении Экологической политики ФГУП «Национальный оператор по обращению с радиоактивными отходами» и его филиалов» (далее – Приказ).
2. Изложить приложение к Приказу в новой редакции согласно приложению № 1 к настоящему приказу.

Figure 6. NORWM environmental policy

CHELYABINSK REGION

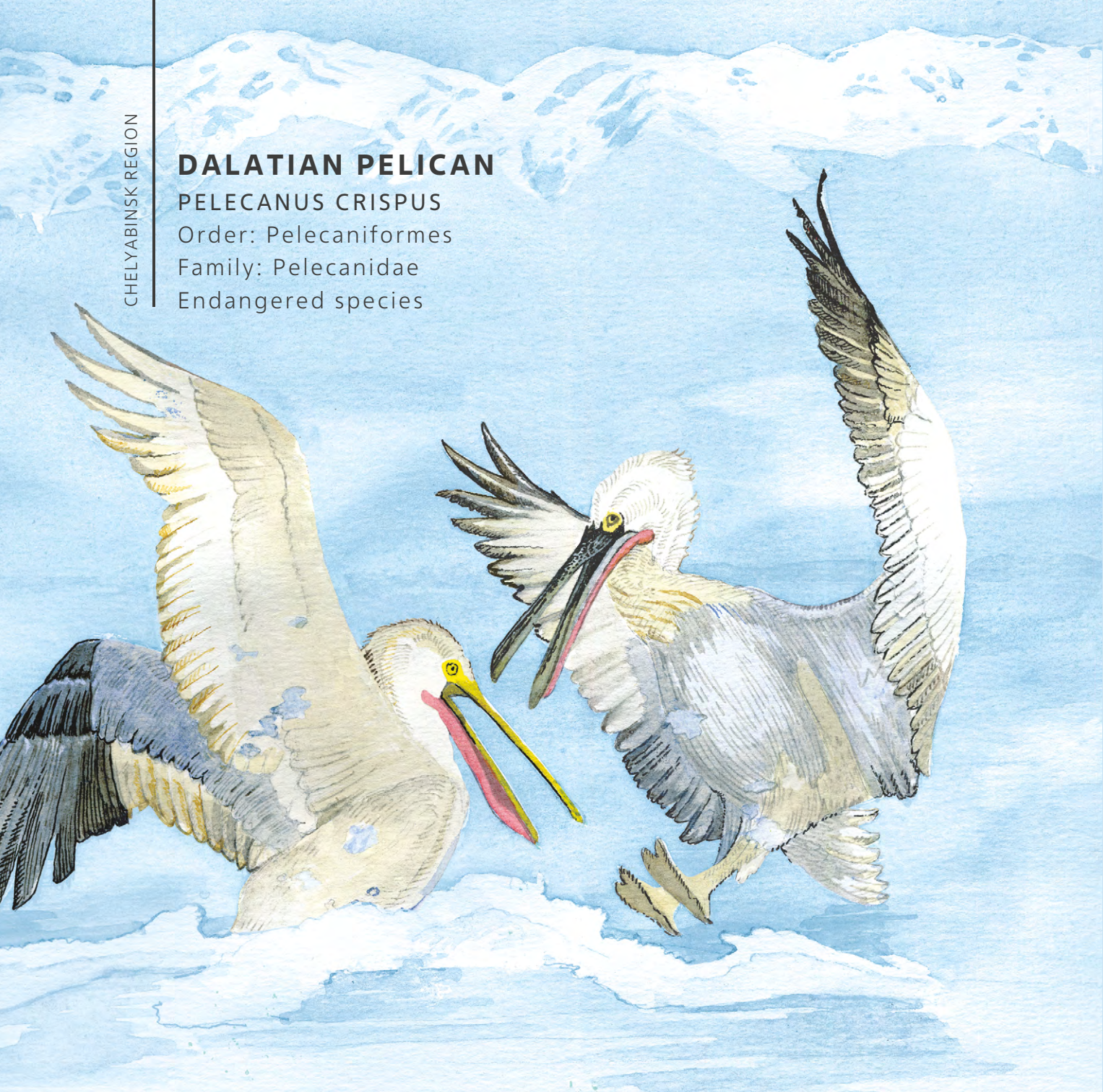
DALATIAN PELICAN

PELECANUS CRISPUS

Order: Pelecaniformes

Family: Pelecanidae

Endangered species



DALATIAN PELICAN

PELECANUS CRISPUS

IT LIVES IN DEEP, RICH AQUATIC VEGETATION RESERVOIRS. IT FEEDS ON FISH. ON THE HEAD AND THE UPPER SIDE OF THE NECK ARE LONG AND TWISTED CURLY FEATHERS WHICH FORM THE LIKENESS OF A MANE

CHELYABINSK REGION

3 ENVIRONMENTAL, QUALITY, OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT SYSTEMS DEVELOPMENT, IMPLEMENTATION, OPERATION AND ENHANCEMENT ACTIVITIES

3.1. Quality management system

In 2014 NORWM introduced a quality management system (hereinafter — QMS) and the quality policy, the last had been updated in 2019.

NORWM QMS is effectively functioning, certified and meets the requirements of GOST R ISO 9001-2015. It is confirmed by the conformity certificate № ROSS RU.C.04FAL.CK.1049 (valid until 25.03.2025), issued by LLC ISO Consulting –quality system certification body, participant of the "European quality standard" voluntary certification system in 2022.

In accordance with ROSATOM requirements and NORWM order of 16.06.2020, divisions responsible for quality management were integrated into Unified Industrial Quality Management System "EOS-Quality" and responsible employees were appointed.

Assessment of QMS effectiveness of NORWM structural subdivisions in 2022:

- 7 internal audits of NORWM QMS efficiency were conducted in 2022 accordingly to NORWM structural divisions internal audits programme;

- for the reporting period the QMS auditors were identified some minor non-conformities during the audit or within the timeframe established by the corrective (preventive) action plan;

- by the quality management service was developed and put into effect the standard of the enterprise STO No. 319 11-01-22 "Quality Management System. Document management. General Provisions";

- 10 field events were held (in St. Petersburg; Magnitogorsk, Chelyabinsk region; Krasnoyarsk; Vyksa, Nizhny Novgorod region; Novokuznetsk, Kemerovo region; Shakhty, Rostov region; Belgorod; Ryazan; Novosibirsk; t Shatsk, Tula region; t Zheleznogorsk, Krasnoyarsk region) aiming on quality complience assessing of the equipment provided by external suppliers and/ or equipment reception for the delivery to NORWM filiations;

- 3 field audits were conducted (Spetsproekt LLC, St. Petersburg; "FEO" FSUE filiation – "Ural territorial district", Yekaterinburg; ANK Service LLC, Novouralsk, Sverdlovsk region) in order to assess the effectiveness of the private quality assurance programmes implementation (hereinafter referred to as QAP).

Based on the audits results, the reports on the working groups were drawn up, the identified inconsistencies and remarks were eliminated, private QAPs were recognized as effective.

All the objectives of the reporting year in the field of quality facing the structural subdivisions of NORWM are successfully achieved.

3.2. Environmental management system (EMS)

In order to improve environmental safety, reduce environmental risks and environmental impact NORWM has implemented environmental management system (hereinafter – EMS), functioning from 2019, keeping up–to-date and constantly improving in accordance with ISO 14001:2015 standards (GOST R ISO 14001:2016).

Environmental goals are annually established (both at the level of divisions/filiations and enterprise as a whole) to implement the principles, established by NORWM Environmental Policy (sanctioned by the order of 18.04.2022). For the goals achievement there is a programme developed for each coming year, formed with the view to risks, opportunities, significant environmental aspects and related requirements of

regulatory legal acts. Achieving the set of environmental goals for 2022 all the programme activities were fulfilled.

At the same time, the external factors changes in 2022 (due to political and economic situations at the international and national levels) affected NORWM activity in the scope of conducting a procedure for EMS certification audit: the certification standard was changed from an international to the national one. There was an agreement, concluded on conduction of an external certification EMS audit on the compliance with the requirements of the national GOST R ISO 14001-2016 standard with the certificate of conformity.

In 2022 conjointly with the Human resources department there was conducted a training for personnel, engaged into EMS and responsible for its operation. The training took place within the course "Environmental management and audit," "Internal audit of the environmental management system at the enterprise according to the requirements of ISO 14001:2015 standards (GOST R ISO 14001-2016, ISO 19011:2018, GOST R ISO 19011 2021) ", a mere 12 people took part in this skill improvement programme.

3.3. Occupational Health and Safety Management System

The occupational health and safety management system was not implemented in NORWM within the past year. The plans for the reporting 2022 and forthcoming 2023 years do not project the aim of this system's introduction.

BLACK WOODPECKER

DRYOCOPUS MARTIUS

Order: Piciformes

Family: Picidae

Rear species

BLACK WOODPECKER

DRYOCOPUS MARTIUS

IT INHABITS LONG-BOLED OLD FORESTS OF VARIOUS TYPES.

IT FEEDS ON WOODY INSECTS

ULYANOVSK REGION

4 INDUSTRIAL ENVIRONMENTAL, RADIATION AND AMBIENT MONITORING

4.1. General guidelines

Ensuring environmental and radiation safety in the regions of NORWM presence is our priority task. Industrial control as an instrument of this mission accomplishment implies two general directions – industrial environmental (IEM) and radiation monitoring (RM), along with the ambient monitoring, that is ensuring the compliance with the requirements in the field of environmental protection and radiation safety established by the legislation of the Russian Federation.

The main task of NORWM monitoring in the field of environmental protection (IEM and RM) is carried out to control the enterprise activities effecting the environment to be performed within the established standards and in accordance with the requirements of the current legislation in the field of environmental protection of the Russian Federation and regulatory documents.

IEM and RM, performed at the NORWM filiations, are realized in two directions:

- environmental legislation requirements compliance control

• radiation protection requirements compliance control.

The Zheleznogorskiy NORWM filiation participates in the ROSATOM industrial system for radiation situation monitoring (OSMRO). Therefore NORWM filiations does not possess its own automatic posts of radiation situation monitoring (ASKRO). Radiation situation monitoring is conducted at the ASKRO post of "GHK" FSUE, situated in the vicinity of LRW DDF “Severniy” landfill.

4.2. Sanitary protection zone and surveillance zone

Sanitary protection zones and surveillance zones of nuclear installations are established in compliance with the requirements of the Federal Law "On the Use of Atomic Energy" (dated 21.11.1995, No. 170-FZ), considering Russian Federation’s sanitary and epidemiological rules and standards

The proportions and boundaries of NORWM sanitary protection zones are defined in the sanitary protection zone projects and are is agreed upon the bodies of state sanitary and epidemiological supervision.

4.3. Basic requirements for organization and conduct of industrial environmental monitoring

The IEM includes monitoring of the NORWM filiations impact (emissions, discharges, waste – if there are existing) on the environment in order to comply with environmental protection requirements and ensure environmental safety.

The basic requirements for IEM organization are established by the Article 67 of the Federal Law of 10.01.2002 No. 7-FZ "On Environmental Protection" (as amended by the Federal Law of 14.07.2022 No. 343-FZ). A report, basing on the results of the IEM, is generated containing the following information:

- emissions of pollutants into the atmospheric air and its sources, if any;
- discharges of pollutants into the environment and its sources, if any;
- production and consumption waste and its disposal objects, if any;
- divisions and (or) officials responsible for the IEM implementation;
- on-site and (or) contracted testing laboratories (centers), credentialed in accordance with the legislation of the Russian Federation on accreditation in the national certification system;

- frequency and methods of IEM implementation, sampling sites and measurement techniques (methods).

In 2022 all the NORWM filiations reports (included to the environmental impact objects register) on IEM for the 2021 were accepted by the Federal Service for the Supervision of Natural Resources.

4.4. Basic requirements for the organization and conduct of radiation monitoring

The requirements for the organization, conduct and composition of radiation monitoring programmes are established by Federal Law No. 190-FZ of 11.07.2011 "On Radioactive Waste Management and Amendments to Certain Legislative Acts of the Russian Federation" (as amended by Federal Law No. 421-FZ of 21.12.2021), Federal Law No. 3-FZ of 09.01.1996 "On Radiation Safety of the Population" (as amended by Federal Law No. 170-FZ of 11.06.2021), as well as Decree of the Russian Federation Chief State Sanitary Inspector of 26.04.2010 No. 40 "On Approval of SP 2.6.1.2612-10 "Basic Sanitary Rules for Ensuring Radiation Safety (OSPORB-99/2010)" (as amended by the Decree of the Russian Federation Chief State Sanitary Inspector of 16.09.2013 No. 43).

The purpose of radiation monitoring is obtaining of the information about personnel and population individual and collective radiation exposure doses, as well as indicators qualifying the radiation situation.

Radiation monitoring covers all the main types of effects of ionizing radiation on people, namely:

- control of emissions of radioactive substances into the atmospheric air;
- content of radioactive substances in the surface layer of atmospheric air and precipitation;
- content of radioactive substances in the surface and underground water;
- volume of secondary radioactive waste generation, the procedure for managing these wastes;
- content of radioactive substances in the soil and vegetation;
- individual radiation doses of personnel;
- gamma radiation dose rates, alpha and beta particle flux densities at workplaces, in production facilities and on the territory of disposal sites;
- content of radioactive aerosols in the air of working and other premises;

- levels of contamination of work surfaces and equipment, skin and uniforms of workers by radioactive substances;
- the level of contamination of vehicles by radioactive substances within the processes of decontamination of equipment, premises and territory of RAW final isolation facilities.

Summarizing the reporting year, NORWM and each of its filiations possess operating radiation monitoring programmes, accorded with the Russian Federal Medical-Biological Agency pursuant to the established procedure.

Radiation monitoring in NORWM and its filiations is carried out in accordance with the established radiation monitoring programmes:

- "Dimitrovgradskiy" filiation – programme of radiation monitoring of the deep disposal site for liquid radioactive waste "Experimental-industrial landfill" of 30.10.2017 No. 319-3/719-P (as amended by Orders No. 319-3/940-P of 10.12.2019, No. 319-3/845-P of 11.10.2021);
- "Zheleznogorskiy" filiation – radiation monitoring programme at the "Severniy" landfill facilities № IN F01-04.111-2021;
- "Severskiy" filiation – industrial monitoring programme for ensuring radiation safety in the "Severskiy" NORWM filiation № RB P-319-f20-100-2020; liquid radioactive waste deep disposal site of the "Severskiy" NORWM filiation radiation monitoring programme № RB PR-319-2/212-2022;
- "Novouralskoe" subbranch of the "Severskiy" filiation – radiation monitoring programme of the near-surface radioactive waste disposal facility in t Novouralsk of 21.08.2020 No. 319-4/4129-VK.

It has to be noted that the perspectives and scope of radiation monitoring can be changed and adjusted during the year if required subject to the executive authorities requirements, exercising state administration, state supervision and control in the field of radiation safety, basing on the specific radiation situation.

4.5. Subsoil condition monitoring

4.5.1. Basic Requirements for the Organization and Conduct of Subsoil Monitoring

The subsoil observation system of "Dimitrovgradskiy", "Zheleznogorskiy" and "Severskiy" NORWM filiations includes the:

- geophysical,
- hydrochemical
- hydrodynamic surveys during RAW underground repository filling process.

General methods to control radioactive waste diffusion through subsoil structure are the geophysical studies of the wells. Geophysical studies include the following types of work:

- gamma logging: to determine the natural gamma background, created by the section forming rocks, and gamma anomalies, caused by the radioactive waste emplacement in any interval of the section;
- thermometry: to determine the layers' temperature rise and to detect cross-flow between the layers, to monitor the impermeability of production strings of observation wells;
- resistivity measuring: to determine the electrical resistivity of waters, filling the well; this serves as an indirect method of integrity determination of the wells casing strings;
- magnetic pulse fault detection: to monitor the integrity of casing strings, as well as to determine severe corrosion areas.

Hydrochemical studies include water sampling from observation wells, followed by the chemical and radiometric analysis.

Hydrodynamic studies are aimed to determine the piezometric surface position of groundwater reservoir and overlying horizons (measuring the pressure levels at the top of wells). The study on changes of the groundwater depth level is carried out to determine the hydrodynamic parameters of the barriers and to study the breached pressure regime of reservoirs and overlying aquifers, as well as to monitor the barriers permeability.

4.5.2. Subsoil condition monitoring conduct. "Dimitrovgradskiy" filiation

The subsurface monitoring was carried out in accordance with the NORWM LRW DDF EIL subsurface monitoring programme of 02.02.2022 No. 319-3/86-P.

The performed monitoring includes:

- sampling from the observation wells of the LRW deep disposal facility;
- conducting of physical, chemical and radiometric analyses of edge water from observation wells.

Primary method of radioactive waste diffusion through subsoil structure control is wells geophysical study. For this purpose we use integrated digital equipment (TRGK, MID-K) based on the logging station.

Observation wells edge water physicochemical and radiometric studies, water supply sources radionuclide content determination were performed in the radiation monitoring laboratory of the State Scientific Centre “Research Institute of Nuclear Reactors” (JSC "SSC RIAR").

LRW DDF engineering facilities, including wells, are in good technical condition for the use as intended in the future.

The current subsurface state in the LRW DDF, basing on the hydrodynamic, hydrochemical and geophysical research data, is acceptable and predictable, subsurface impact is expectative and permissible. RAW is allocated at the operated facilities within the territory of the licensed subsoil tract. There is no indication of technogenic changes in natural geological conditions in buffer and overlying aquifers, including saline-free groundwater.

The amount of work carried out within the framework of monitoring is reflected in Table 2.

Table 2

The scope of works performed on subsoil monitoring for the period 2018 – 2022

Types of works	Scope of investigations (amount)				
	2018	2019	2020	2021	2022
Hydrodynamic studies in observation wells	89	84	122	147	89
Hydrochemical analysis of samples from observation wells	61	62	61	62	61
Geophysical studies in observation wells	89	84	84	85	89

"Zheleznogorskiy" filiation

Subsoil monitoring was carried out in accordance with the subsoil and underground structures of the LRW DDF "Severniy" landfill condition monitoring programme (of 14.04.2022 No. 319-1/345-P). The performed monitoring measures include:

- measurements of the groundwater level in the wells, experimental hydrogeological testing (filling and pumping);
- sampling and analysis of edge water from the observation wells;
- integrated logging survey including gamma-ray logging, thermometry, acoustic cement-bond logging, resistivity logging, electromagnetic fault detection

The amount of work carried out within the framework of monitoring the state of the subsoil is reflected in Table 3.

The current subsoil state of the DDF "Severniy" landfill area according to hydrodynamic, hydrochemical, and geophysical monitoring data, is acceptable and predictable, the subsoil impact is expectative and permissible. RAW is allocated at the operated facilities within the territory of the licensed subsoil tract. There is no indication of technogenic changes in natural geological conditions in buffer and overlying aquifers, including saline-free groundwater.

"Severskiy" filiation

Subsoil monitoring was carried out in accordance with the subsoil and underground structures monitoring regulations of NORWM "Severskiy" filiation LRW DDF on the "NORWM "Severskiy" filiation LRW DDF programme of subsoil and underground structures monitoring" in 2022 (established by the order No. P-319-2/199-2021).

Table 3

The scope of works performed on subsoil monitoring for the period 2018 – 2022

Types of works	Scope of investigations (amount)				
	2018	2019	2020	2021	2022
Hydrodynamic studies in observation wells	974	1498	1086	1086	1114
Hydrochemical analysis of samples from observation wells	266	344	383	383	389
Geophysical studies in observation wells	197	343	393	393	389

The scope of works performed in 2022 on subsoil state monitoring is represented in the Table 4.

The current subsoil state of the LRW DDF of "NORWM "Severskiy" filiation according to hydrodynamic, hydrochemical, and geophysical monitoring data, is acceptable and predictable, the subsoil impact is expectative and permissible.

Table 4

The scope of works performed on subsoil monitoring for the period 2018 – 2022

Types of works			Scope of investigations (amount)				
			2018	2019	2020	2021	2022
1. Hydrodynamic studies in observation wells, tolal:			1668	1668	1668	1668***	960
1.1. 18 landfill ground			924	924	924	924	530
1.2. 18a landfill ground			580	580	580	580	330
1.3. Regional control wells			164	164	164	164	100
2. Hydrochemical analysis of samples from observation wells			99	99	99	99	115
2.1. 18 landfill ground			53	53	43	43	53
2.2. 18a landfill ground			42	42	49	45	55
2.3. Regional control wells			4	4	7	-	7
Geophysical studies in observation wells	3. I logging assemblage*, tolal:		80	80	80	80	80
	3.1. 18 landfill ground		31	31	38	38	38
	3.2. 18a landfill ground		49	49	42	42	42
	3.3. Regional control wells		0	0	0	0	0
	4. II logging assemblage **, tolal:		40	40	40	40	40
	4.1. therefrom: 18 landfill ground		22	22	28	20	20
	4.2. 18a landfill ground		22	22	10	19	18
	4.3. Regional control wells		7	7	2	1	2

* I logging assemblage is used to identify the degree and nature of operational horizons filling at "NORWM "Severskiy" filiation LRW DDF for assessing the LRW filtrate distribution.
** II The logging assemblage is used to assess the technical condition of the wells underground part.
*** In addition to standard hydrodynamic studies according to the monitoring programme, 175680 measurements of groundwater levels were done by sensors, every hour measuring the level of edge waters (in 20 wells).

"Novouralskoe" subbranch of the "Severskiy" filiation

The subsoil state is not monitored the at the "Novouralskoye" subbranch of "Severskiy" filiation, as subsoil state monitoring is not applicable for the near-surface disposal of radioactive waste.

4.6. Schemes of control posts and environmental monitoring system at the territories of operating facilities / branches / departments, sanitary protection and surveillance zones of NORWM

Scheme-map of radiological and environmental (radiometrical) monitoring in the DDF "Severny" landfill area is represented at the Figure 7.

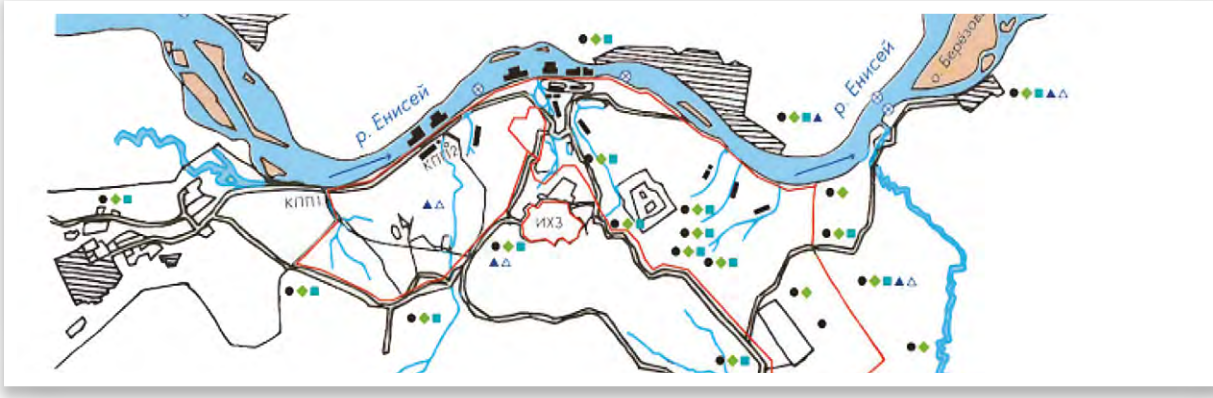


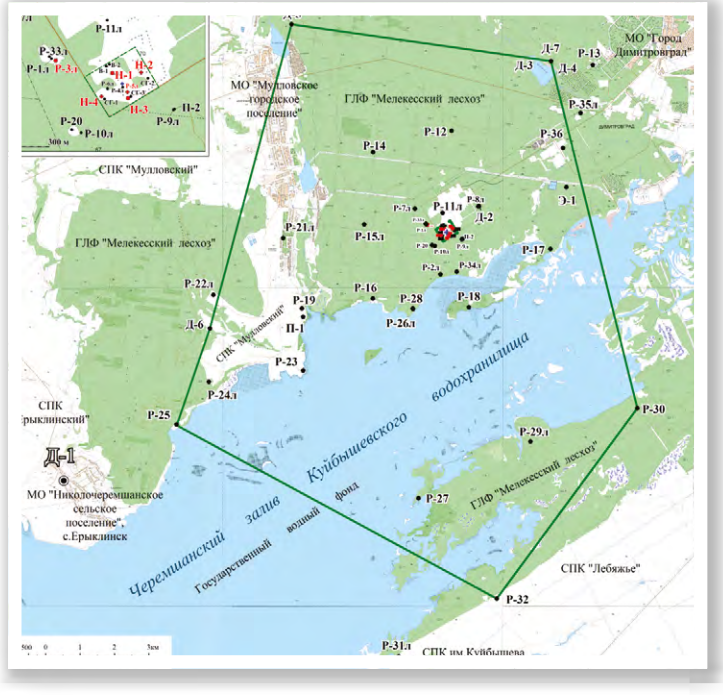
Figure 7. Scheme-map of radiological and environmental (radiometrical) monitoring in the DDF "Severny" landfill area

Control points:

- Precipiation
- Air
- Water
- Bottom sediments seaweed
- Soil
- Grass
- Snow
- Sanitary protection area
- Security area
- Road

“Dimitrovgradskiy” filiation

Monitoring network diagram of the LRW DDF "Experimental-industrial landfill" is represented at the Figure 8.



Legend

Н-4	Injection wells: to upper reservoir
Н-1	to lower reservoir
Р-18	Observation wells
СГ-1	Sanitary-hydrogeological weels
В-1	Water wells
Р-26л	Abandoned wells (with л-prefix)
Д-1	Additional observation recommended by State Commission Federal Subsoil Use
	The border of deep disposal nearest subsoil mining allotment (exposure)
	The border of deep disposal farthest subsoil mining allotment (in operated formations and buffer complex)
	DDF relative center

Figure 8. LRW DDF monitoring network, boundaries of mineral block allocation and the sanitary protection zone "Experimental-industrial landfill" (Dimitrovgrad, Ulyanovsk region)

“Severskiy” filiation

Radiation monitoring points of atmospheric air and precipitations, gamma radiation dose rate, snow cover, soil, vegetation (grass) layout is shown at the Figure 9; layout of groundwater monitoring stations – at the Figure 10.

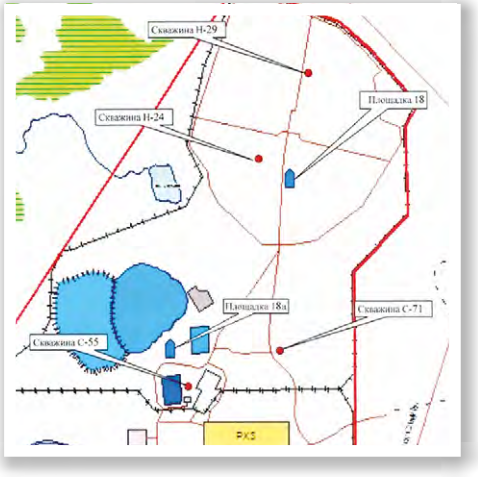
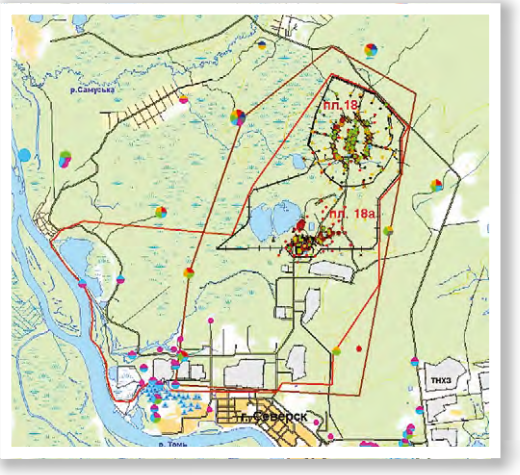


Figure 9. Radiation monitoring points of atmospheric air and precipitations, gamma radiation dose rate, snow cover, soil, vegetation (grass) layout



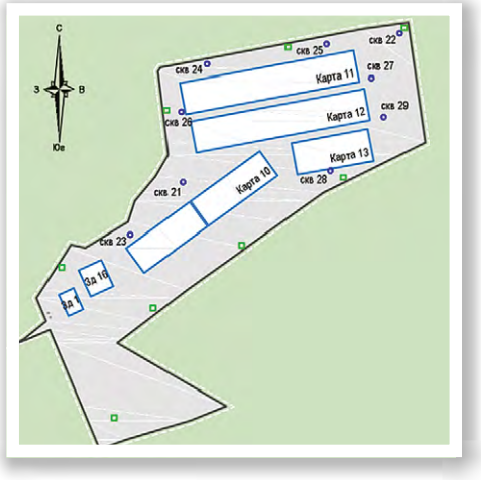
Legend:

- SKhK sanitary protecion area borders
- Subsoil mining allotment border
- Landfill border
- Observation wells clusters
- Landfill check wells
- Industrial construction sites
- Farmsteads

Figure 10. Observation control wells layout of LRW DDF of NORWM “Severskiy” filiation

“Novouralskoe” subbranch of the “Severskiy” filiation

Figure 11 represents the NSDF diagram, indicating the sampling locations from the natural environment and observation wells.



Legend:

markers at the picture:

Observation wells

Conditional sampling of controlied environmental

Figure 11. Symbols of the natural environment (snow, vegetation, soil) sampling locations, observation wells locations

4.7. Information on activities and laboratories configuration with indication of accreditation information in the analytical laboratory system.

NORWM (and its filiations) do not possess their own laboratories, monitoring the radiation situation, this activity is carried out by the external agencies on the contract basis. Environmental radiation monitoring is implemented by the laboratories allowed for work in accordance with accreditation certificates of testing and radiation laboratories in accordance with the procedure, established by the Russian Federation legislation.

“Zheleznogorskiy” filiation

Laboratory analysis of water and gas samples for the harmful chemicals and radionuclide content was carried out in the reporting year, as in previous years, by the FSUE MCC laboratories (unique entry number in the register of accredited persons RA.RU.21HC82), on the basis of contracts:

- contract of 14.01.2019 and 08.02.2022 for the provision of services for the laboratory analysis of water and gas samples for the radionuclides content and harmful chemicals, taken at the LRW DDF “Severniy” landfill of the NORWM “Zheleznogorskiy” filiation;

- contract of 13.12.2018 and of 21.04.2022 on the provision of continuous radioecological monitoring services of the environment in the area of the LRW DDF "Severniy" landfill of the NORWM “Zheleznogorskiy” filiation.

“Dimitrovgradskiy” filiation

Laboratory studies and sample testing of underground water, soil and liquid radioactive waste of class 5 are carried out in the radiation monitoring laboratory of the State Scientific Centre “Research Institute of Nuclear Reactors” (JSC "SSC RIAR") in order to determine its physicochemical and radiation characteristics (the contract of 10.06.2021).

Radiation monitoring execution of the LRW DDF of the NORWM “Dimitrovgradskiy” filiation experimental-industrial landfill is carried out by the JSC "SSC RIAR" laboratory under the contract of 30.07.2021.

"Severskiy" filiation

Environmental monitoring in the area of LRW DDF 18 and 18a grounds landfill was carried out in the reporting year, as before in previous years, accredited by the Environmental Protection Laboratory, Radiation Industrial and Sanitary Laboratory of SCC JSC under the agreement of 08.09.2021.

“Novouralskoe” subbranch of the "Severskiy" filiation

NSDF laboratory tests and research practices execution within 2022 radiation monitoring programme (as for the five previous years) was performed by the specialists of “Novouralskoe” subbranch of the "Severskiy" NORWM filiation together with ANK-Service LLC specialists under the service agreement. ANK-Service LLC holds the licence issued by Rostekhnadzor of 07.06.2018 and Certificate of Accreditation of 09.02.2018 No. РОСС RU.0001.21ЧЦ36.

4.8. Principal output of radiation monitoring for the report period

NORWM and its filiations environmental facilities state monitoring for the reporting year was comprehensively performed pursuant to the Radiation Monitoring Programme, listed here in §4.4.

Radiation monitoring results for the 2018 – 2022 period

are represented in the Table 5.

Table 5

Radiation monitoring results for the 2018 – 2022 period							
Filiation/ subbranch	MU	Defined parameters (annual average value)					Permissible limit
		2018	2019	2020	2021	2022 (reported year)	
1. The enterprise territory within the sanitary protection zone boundaries							
1.1. Ionization exposure rate of gamma emission							
“Zheleznogorskiy” filiation	mcSv/h	0,08	0,1	<0,1	<0,1	<0,1	1-2
“Dimitrovgradskiy” filiation		0,1	0,08	0,08	0,07	0,07	1-2
"Severskiy" filiation»		0,06-0,14	0,05-0,13	0,06-0,11	0,06-0,10	0,06-0,11	1-2
“Novouralskoe” subbranch of the "Severskiy" filiation		0,07	0,10	0,08	0,08	0,08	1-2
1.2. Alfa emission flux rate							
“Novouralskoe” subbranch of the "Severskiy" filiation	particle/ (cm^2min)	<0,01	<0,01	<0,01	<0,01	<0,01	-
1.3. Beta emission flux rate							
“Dimitrovgradskiy” filiation	particle/ (cm^2min)	not detected					-
“Novouralskoe” subbranch of the "Severskiy" filiation		2,78	3,16	5,58	3,82	3,72	-
Ionization exposure rate of gamma emission at the administered territories does not demonstrate growth dynamics and does not exceed the permissible reference level during 5-year observation period.							
2. Atmospheric air							
2.1. Radionuclides emissions into the atmosphere volume activity							
2.1.1. Alpha-emitting radionuclides total volume activity							
“Zheleznogorskiy” filiation	Bq/year	not detected					-
"Severskiy" filiation		$5,99 \times 10^5$	$3,46 \times 10^5$	$3,66 \times 10^5$	$1,62 \times 10^5$	$2,27 \times 10^5$	-
2.1.2. Beta-emitting radionuclides total volume activity							
“Zheleznogorskiy” filiation	Bq/year	$3,43 \times 10^6$	$5,54 \times 10^5$	$1,029 \times 10^6$	$9,83 \times 10^5$	$1,33 \times 10^6$	-

Table 5

"Severskiy" filiation	Bq/m^3	1,09 ×10^7	5,51 ×10^6	2,73 ×10^6	2,09 ×10^6	2,66 ×10^6	-
2.2. Radionuclides atmospheric air volume activity (in the atmospheric air earth's surface layer)							
2.2.1. Alpha-emitting radionuclides total volume activity							
"Zheleznogorskiy" filiation	Bq/m^3	(0,12±0,03) ×10^{-3}	(0,1±0,06) ×10^{-3}	(0,12±0,06) ×10^{-3}	(0,11±0,5) ×10^{-3}	(0,12±0,05) ×10^{-3}	-
"Severskiy" filiation		(0,37±0,14) ×10^{-4}	(1,1±0,2) ×10^{-5}	(2,0±0,1) ×10^{-5}	(3,4±0,7) ×10^{-5}	(1,9±0,6) ×10^{-5}	-
"Novouralskoe" subbranch of the "Severskiy" filiation		4,33 ×10^{-5}	5,14 ×10^{-5}	<4,37 ×10^{-5}	<9,08 ×10^{-5}	<0,0001	-
2.2.2. . Beta-emitting radionuclides total volume activity							
"Zheleznogorskiy" filiation	Bq/m^3	(0,69±0,19) ×10^{-3}	(0,62±0,25) ×10^{-3}	(0,48±0,21) ×10^{-3}	(0,36±0,17) ×10^{-3}	(0,35±0,16) ×10^{-3}	-
"Severskiy" filiation		(5,1±1,9) ×10^{-4}	(1,9±0,2) ×10^{-4}	(3,2±0,3) ×10^{-4}	(4,1±1,0) ×10^{-4}	(2,1±0,4) ×10^{-4}	-
"Novouralskoe" subbranch of the "Severskiy" filiation		2,13 ×10^{-3}	1,11 ×10^{-5}	<1,00 ×10^{-3}	<2,5 ×10^{-4}	<0,0001	-
Radionuclide emissions to the atmospheric air total volume activity does not exceed annual average values during 5-year observation period							
3. Underground water from the observational shafts Specific activity of radionuclides in underground water from the monitored boreholes (water from water supply sources)							
3.1. Specific activity by the sum of alpha-emitting radionuclides							
"Zheleznogorskiy" filiation	Bq/kg	<0,1	<0,14	<0,2	<0,2	<0,2	0,2
"Dimitrovogradskiy" filiation		0,04	0,05	0,08	0,14	0,12	0,2
"Severskiy" filiation		<0,2	<0,2	<0,2	<0,2	<0,2	0,2
"Novouralskoe" subbranch of the "Severskiy" filiation		<0,05	1,37 ×10^{-1}	9,13 ×10^{-2}	<9,08 ×10^{-5}	<0,1	0,2
3.2. Удельная активность по сумме бета-излучающих радионуклидов							
"Zheleznogorskiy" filiation	Bq/kg	<0,2	<0,26	<0,26	<0,25	<0,28	1,0
"Dimitrovgradskiy" filiation		0,05	0,09	0,06	0,13	0,2	1,0
"Severskiy" filiation		<0,07	<0,07	<0,07	<0,07	<0,07	1,0

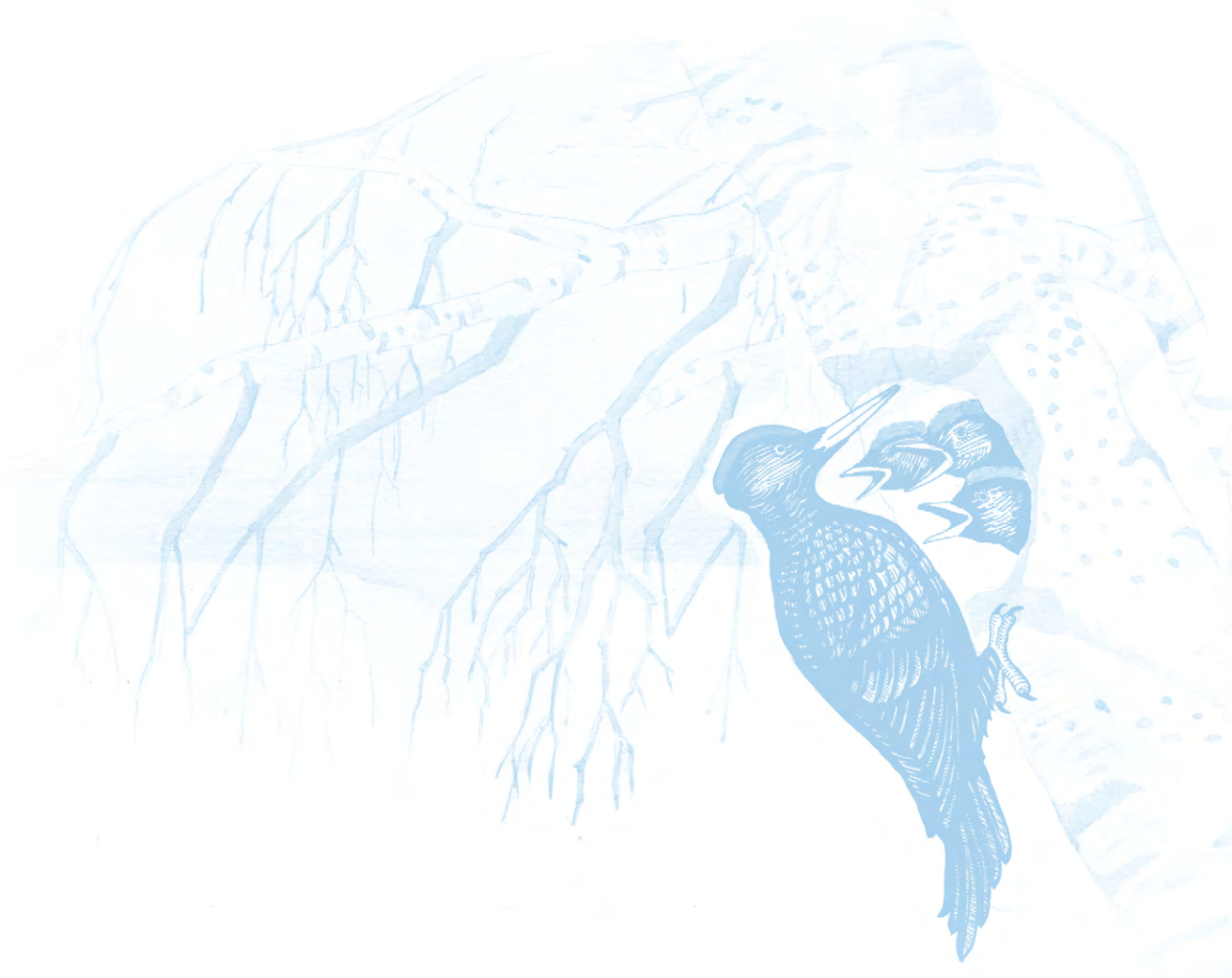
Table 5

“Novouralskoe” subbranch of the "Severskiy" filiation		<0,1	4,00 ×10^{-2}	2,65 ×10^{-1}	<1,16 ×10^{-1}	<0,1	1,0
For the 2018 – 2022 monitoring period of underground water from the observational shafts no excess of radionuclides specific activity permissible levels was recorded.							
4. Snow cover. Radionuclides specific activity in the snow cover samples.							
4.1. Specific activity by the sum of alpha-emitting radionuclides							
"Severskiy" filiation	Bq/m^2	21,0-24,0	3,8-4,7	2,9-3,2	2,2-4,9	1,1-1,8	-
“Novouralskoe” subbranch of the "Severskiy" filiation		<0,05	<0,05	<0,05	<0,07	<0,07	-
4.2. Удельная активность по сумме бета-излучающих радионуклидов							
“Zheleznogorskiy” filiation	Bq/m^2	14,3	26,7	21,3	30,7	25,7	-
"Severskiy" filiation		-	-	-	-	<69	-
“Novouralskoe” subbranch of the "Severskiy" filiation		<0,01	<0,01	<0,01	<0,1	<0,1	-
For the 2018 – 2022 monitoring period no excess of radionuclides specific activity permissible levels in the snow cover samples was recorded							
5. Soil. Radionuclides specific activity in the soil samples							
5.1. Specific activity by the sum of alpha-emitting radionuclides							
“Dimitrovgradskiy” filiation	Bq/kg	-	-	-	(5,2±1,9) ×102	≤ 4 ×102	-
“Novouralskoe” subbranch of the "Severskiy" filiation		903,2	768,2	690,7	<200	<200	-
5.2. Specific activity by the sum of beta-emitting radionuclides							
“Zheleznogorskiy” filiation	Bq/m^2	1,17×10^3	5,63×10^3	4,03×10^2	5,93×10^2	4,6×10^2	-
“Dimitrovgradskiy” filiation	Bq/kg	-	-	-	(5,6±2,1) ×10^2	(3,3±1,1) ×10^2	-
“Novouralskoe” subbranch of the "Severskiy" filiation		367,2	467,5	280,0	<100	<100	-

Table 5

At the territories monitored for the 2018 – 2022 period the pollution of soil by the alpha-active nuclides at the control spots is at the level of the background content. Total beta-activity and specific activity of natural and technogenic radionuclides do not excess worldwide average radionuclides content, conditioned by the bulk earth values and global precipitation, and are significantly lower than the average level in the regions of NORWM presence.							
6. Vegetation. Radionuclides specific activity in the vegetation samples							
6.1. Specific activity by the sum of alpha-emitting radionuclides							
“Severskiy”filiation	Bq/kg	-	-	-	-	-	-
“Novouralskoe” subbranch of the "Severskiy" filiation		<0,1	<3,5	3,5	3,2	<250	-
6.2. Specific activity by the sum of beta-emitting radionuclides							
“Zheleznogorskiy” filiation	Bq/kg	48	17	-	16	21,8	-
“Novouralskoe” subbranch of the "Severskiy" filiation		482,0	370,0	<260	<250	728	-
For the 2018 – 2022 monitoring period no exceedance of the radionuclides specific activity at the monitored territories was recorded.							

For the reporting year, radiation control in NORWM and its filiations was carried out in full. According to the results of radiation monitoring of environmental objects for 2022, the content of radioactive substances at the monitored objects is significantly lower than permissible levels (NRB-99/2009, SanPiN 1.2.3685-21).



COMMON KINGFISHER

ALCEDO ATTHIS

Order: Coraciiformes

Family: Alcedinidae

Vulnerable and small-numbered species

COMMON KINGFISHER

ALCEDO ATTHIS

INHABITS THE SHORES OF RESERVOIRS, NESTS IN BURROWS DUG IN THE GROUND. IT FEEDS ON FISH, AQUATIC INSECTS, CRUSTACEANS. IT HUNTS BY RUSHING INTO THE WATER FOR PREY. CAPABLE OF TAKING OFF FROM UNDER WATER

TOMSK REGION

5 ENVIRONMENTAL IMPACT

5.1. Overview of environmental impact facilities categories

In accordance with the criteria approved by the Decree of the Government of the Russian Federation of 31.12.2020 No. 2398 “On approval of criteria for classifying objects that have a negative impact on the environment as objects of categories I, II, III, IV”, “Zheleznogorskiy”, “Severskiy” (with its “Novouralskoe” subbranch) and “Dimitrovgradskiy” NORWM filiations are assigned to the II category objects of negative environmental impact (meaning environment moderate exposure).

NORWM filiations, included into the register of negative environmental impact objects, are represented in the Table 6.

NORWM and its filiations developed the supporting documents and received the following permits in the sphere of environmental impact and specifically the environmental impact declarations:

- for the DDF LRW EIL of “Dimitrovogradskiy” NORWM filiation (73-0173-000332-P of 23.07.2021);

Table 6

NORWM filiations, enlisted to the objects register of negative environmental impact (NEI), including the facilities, taken out of commission

Facilitiy's information / Report's name	Filiation / subbranch						
	"Zheleznogorskiy" filiation				"Dimitrovgrad-skiy" filiation	"Severskiy" filiation	"Novouralskoe" subbranch of the "Severskiy" filiation
NEI facility number	04-0124-001939-П	04-0124-001938-П	04-0124-001937-П	04-0124-002171-П	73-0173-000332-П	69-0170-001164-П	65-0166-002463-П
NEI facility name	Industrial site of the liquid RAW deep disposal facility "Severniy landfill" of NORWM "Zheleznogorskiy" filiation (LRW DDF "Severniy landfill")	Industrial site of facility 353g – NORWM's "Zheleznogorskiy " filiation	Industrial site of facility 353a – NORWM's "Zheleznogorskiy" filiation	RAW storage facility (Krasnoyarsk region, Nizhnekanskiy massive) within the URL	LRW deep disposal facility "Experimental-industrial landfill"	LRW deep disposal facility (LRW DDF "18 and 18a grounds landfill")	Near surface RAW disposal facility
NEI category	II	II	II	III	II	II	II
Strike off the register confirmation documents		Striked off the register 23.12.2022 (extract from the State Registry of NEI objects № 7454850)	Striked off the register 23.12.2022 (extract from the State Registry of NEI objects № 7455073				

- for the DDF LRW landfill "Severniy" of NORWM's "Zheleznogorskiy" filiation (04-0124-001939-P of 05.03.2021);
- for the DDF LRW "18 and 18a grounds landfill" of NORWM's "Severskiy" filiation (69-0170- 001164-P of 23.03.2020).
- for the "Near surface RAW disposal facility" (under development).

5.2. Innovative practices infusion, technologies aiming environmental negative impact reduction modernization

NORWM did not have any measures planned for implementation in 2022 in accordance with ROSATOM's "Plan on the negative environmental impact minimization until 2025".

5.3. Water abstraction from water sources. Volume of water consumption.

"Dimitrovogradskiy", "Severskiy" (and its "Novouralskoe" subbranch)

NORWM filiations do not proceed independent water intake from natural sources. Water in this filiations / subbranch is supplied under contracts for the provision of water supply services.

There are no circulating and repeated water supply systems in the filiations / subbranch.

"Zheleznogorskiy" filiation

By the end of 2022 year 4.66 thousand m3 of water was pumped from the mining level to compensate the in-situ pressure, of which:

- 4.54 thousand m3 – for operational needs;
- 0.12 thousand m3 – for domestic and practical needs.

The allowable water intake from relief wells is 65 thousand m^3.

The provision of drinking water to "Zheleznogorskiy" filiation staff in 2022 had been realized according to the contract from the 26.05.2021 on the provision of bottled water supply.

There are no circulating and repeated water supply systems at the LRW DDF facilities.

"Dimitrovogradskiy" filiation

Water for practical and drinking needs is supplied from the centralized water supply system to the administrative and amenity

building, where the personnel, who operates and monitors the condition of facilities at the industrial site of the LRW DDF, is allocated.

The water supply executes the leaseholder (JSC "SSC RIAR") under the lease agreement of industrial premises. Household and drinking water supply of office premises is provided under the agreement with Ulyanovsk Regional Water Utility LLC.

There are no circulating and repeated water supply systems in the filiation

5.4. Discharges to the open hydrographic system

"Dimitrovogradskiy", "Zheleznogorskiy", "Severskiy" (and its "Novouralskoe" subbranch) NORWM filiations do not discharge polluting substances or radionuclides into the open hydrographic network. Water is disposed into centrally directed sewer system under contracts for the range of services.

5.5. Emissions to the atmospheric air

5.5.1. Polluting substances emissions (hereinafter PSE)

"Zheleznogorskiy" filiation

The actual PSE in 2022 amounted to 16.995 tons, this information was included into NORWM's environmental report for 2021 causally to the registration of a new NEI facility (facility 04-0124-002171-P – Radioactive waste storage facility (Krasnoyarsk region, Nizhnekanskiy massif) within the URL (construction site).

Emission volumes of pollutants were determined according to methods approved in accordance with the established procedure based on emission calculations by specific indicators.

Emissions of "Zheleznogorskiy" filiation main pollutants are presented in the Table 7.

"Dimitrovogradskiy", "Severskiy" (and its "Novouralskoe" subbranch) filiations

There are no stationary sources of pollutant emissions into the atmosphere at "Dimitrovogradskiy", "Severskiy" (and its "Novouralskoe" subbranch) NORWM filiations.

Table 7

"Zheleznogorskiy" filiation polluting substances emissions in 2021–2022

PSE	PSE code	Hazard class	tonne /year	
			2021	2022
Total:	–	–	16,995	16,995
Including				
Solid of them:	–	–	0,908	0,908
Carbon (soot)	0328	3	0,908	0,908
Gaseous and liquid, of them:	–	–	16,087	16,087
Sulphur dioxide	0330	3	0,644	0,644
Carbonic oxide	0337	4	7,422	7,422
Nitrogen oxide (in equivalent of NO_2)	0304	3	5,522	5,522
Hydrocarbons (without volatile organic compound)	–	–	0	0
Volatile organic compounds (VOC), of them:	–	–	2,499	2,499
Gasolene (benzine, low sulfur) in equivalent of carbon	2704	4	2,499	2,499
Kerosene	2732	–		
Mix of saturated hydrocarbons (C1-C5)	0415	4		

5.5.2. Greenhouse gas emissions

NORWM is not an organization which economic and other activities comes amid with the greenhouse gas emission, which mass is determined by Article 7 of the Federal Law of 02.07.2021 No. 296-FZ "On Limiting Greenhouse Gas Emissions."

5.5.3. Emissions and volumes of utilization of ozone depleting substances

In accordance with the "List of substances, depleting the ozone screen, which overturn is subjected to the State regulation", approved by the Russian Federation's Government Decree dated 18.02.2022 No. 206 "On State regulation measures for overturn and consumption of substances, depleting the ozone screen", NORWM does not consume and overturn (i.a. product, use, store, recover, remediate, recycle or deteriorate) substances, destroying the ozone screen.

5.5.4. Radionuclide emissions

The values of allowable emissions (AE) to the atmospheric air in NORWM are regulated by the Standards of maximum permissible emissions (hereinafter referred to as MPE) of radioactive substances to the atmospheric air, approved within the procedure, corresponding to Russian Federation's legislation. Compared to 2021 in 2022, the Standards had no changes. No cases of exceeding the established levels of allowable emissions of radioactive substances into the atmosphere have been registered.

The information below is represented being arranged by the filiations.

"Dimitrovogradskiy" filiation

There are no sources of radioactive emissions into the air in the filiation, that are subjected to regulatory control.

"Zheleznogorskiy" filiation

"Zheleznogorskiy" filiation releases radionuclides basing on the "Permit on the radioactive substances release into the atmosphere" dated April 15, 2021 No. GN-VR-0012, issued by the Federal Environmental, Industrial and Nuclear Supervision Service (valid until May 1, 2028).

The total emissions into the atmospheric air in 2022 amounted to:

- beta-emitting nuclides – 1.33×106 Bq/year, which is below 0.018% of the established MPE standards.

There are no releases of alpha-emitting nuclides.

Information on radionuclides releases into the atmospheric air for the period 2018 – 2022 is represented in the Tables 8 and 9.

Radionuclides emissions to the atmospheric air in 2022 as in previous years were at the consistently low level and amounted to > 0.19% of the MPE (MPE is the sanitary standard for the release of radionuclides established for each filiation/subbranch by the supervisory authorities).

The dynamics of radionuclide releases of "Zheleznogorskiy" filiation for the period 2018 – 2022

Table 8

Radionuclide	Actual releases of radionuclides into the atmosphere									
	2018		2019		2020		2021		2022	
	Bq/year	% MPE	Bq/year	% MPE	Bq/year	% MPE	Bq/year	% MPE	Bq/year	% MPE
Sum of alpha-emitting nuclides	There are no releases of alpha active nuclides									
Sum of beta-emitting nuclides	$3{,}43\times10^{6}$	1,170	$5{,}5406\times10^{5}$	0,265	$1{,}029\times10^{6}$	0,286	$9{,}83\times10^{5}$	> 0,010	$1{,}33\times10^{6}$	0,018

Percentage of actual radionuclide release in 2022 to the allowable release level

Table 9

Radionuclide	^{90}Sr	^{90}Cs
AE %	0,19	0,003

“Severskiy” filiation

“Severskiy” filiation releases radionuclides basing on the “Permit on the radioactive substances release into the atmosphere” dated April 15, 2021 No. GN-VR-0011, issued by the Federal Environmental, Industrial and Nuclear Supervision Service (valid until May 1, 2028).

The total emissions into the atmospheric air in 2022 amounted to:

- alpha-emitting nuclides – 2,27×105 Bq/year, which is 0,02% of the established MPE standards;
- beta-emitting nuclides – 2,66×106 Bq/year, which is 0,03% of the established MPE standards.

Information on radionuclides releases into the atmospheric air for the period 2018 – 2022 is represented in the Tables 10 and 11.

The total emissions into the atmospheric air in 2022 were at a consistently low level as in previous years, and amounted to:

- 0,02 % of MPE on the sum of alpha-emitting nuclides;
- 0,03 % of MPE on the sum of beta-emitting nuclides.

The specified content of radionuclides corresponds to the levels of long-term observations, typical for the area of the sanitary protection zone of the SCC JSC territory.

Table 10

The dynamics of radionuclide releases of “Severskiy” filiation for the period 2018 – 2022

Radionuclide	Actual releases of radionuclides into the atmosphere									
	2018		2019		2020		2021		2022	
	Bq/year	% MPE	Bq/year	% MPE	Bq/year	% MPE	Bq/year	% MPE	Bq/year	% MPE
Sum of alpha-emitting nuclides	$5,99\times10^{5}$	0,142	$3,46\times10^{5}$	0,400	$3,66\times10^{5}$	0,430	$1,62\times10^{5}$	0,015	$2,27\times10^{5}$	0,020
Sum of beta-emitting nuclides	$1,09\times10^{7}$	0,034	$5,51\times10^{6}$	0,700	$2,73\times10^{6}$	0,360	$2,09\times10^{6}$	0,021	$2,66\times10^{6}$	0,030

Table11	Percentage of actual radionuclide release in 2022 to the allowable release levels			
	Radionuclide	% AE	Radionuclide	% AE
	^{239}Pu	0,02	^{103}Ru	0,01
	^{235}U	0,02	^{106}Ru	0,02
	^{238}U	0,03	^{137}Cs	0,07
	^{234}U	0,03	^{95}Nb	0,22
	^{237}Np	0,03	^{95}Zr	0,06
	^{241}Am	0,01	^{90}Sr	0,02
	^{141}Ce	0,04	^{60}Co	0,03
	^{144}Ce	0,09		

“Novouralskoe” subbranch of "Severskiy" filiation

In the process of production activities, NSDF does not release radioactive substances into the atmosphere, since there are no stationary sources of emissions at NSDF.

5.6. Wastes

5.6.1. Operation and consumption waste management

The management of operation and consumption waste, generated during the operation of RAW disposal facilities is carried out in accordance with the requirements of the Federal Law of 24.06.1998 No. 89-FZ "On Operation and Consumption Waste" and in accordance with the instructions for the management of operation and consumption waste. In NORWM’s filiations responsible persons are appointed the with the object of collection and accounting of operation and consumption waste. NORWM does not process operation and consumption waste. NORWM’s waste generation and disposal over the past year have been realized according to the established standards.

Wastes generated as a resulting to anthropogenic activities of a filiation / subbranch include:

- solid municipal waste (hereinafter referred to as SMW) being transferred to the regional operator in accordance with the legislation of the Russian Federation;
- wastes of operation and consumption being transferred for further processing or disposal to specialized facilities according to the concluded agreements.

The collection of operation and consumption wastes and SMW is produce in the specially equipped places.

In total, 36.680 tons of waste were generated consequent to NORWM and its filiations /subbbranch activities, of which 35.530 tons were SMW, the entire volume of waste had been transferred to specialized licensed organizations.

Cooperation with contractors in the field of environmental protection and safety is realized basing of the relevant Procedure establishing the requirements imposed by NORWM on its contractors and/or subcontractors performing the construction, repair, survey and other types of works at the sites of its filiations/subbranches.

“Dimitrovogradskiy” filiation

Leased operation facilities are used for the exploitation of the LRW DDF. In accordance with the lease agreement, the lessor collects operation and consumption waste, generated in the rented premises, and further transports, stores, deactivates, processes, and takes other actions to completely dispose the waste and its neutralization products in accordance with the Russian Federation’s current legislation requirements.

Through 2022, 7.180 tons of MSW were generated along of the office premises activities that were transferred to the Ecosystem LLC regional operator on the agreement basis, during 2022 year 7.180 tons of MSW total had been passed over. Under this treaty, regional operator receives waste in bulk and at the place, determined by the agreement, ensures its transportation, processing, deactivation, disposal in accordance with the Russian Federation’s law.

Data on the types of waste generated mentioning the Federal Classification Catalog of Wastes (hereinafter FCCW) code indication along with their generation standard are represented in the table below:

Waste type	FCCW code	Generation standard, tons/year
Wastes from office and utility spaces, unsorted (excluding oversized)	7 33 100 01 72 4	7,180

The waste volumes generated during 2018 – 2022 are represented in the Table 12.

Table 12

Dynamics of the operation and consumption generated waste management in "Dimitrovogradskiy" filiation during 2018 – 2022 period						
	Indice	2018	2019	2020	2021	2022
	Totally generated, of these:	0	0	3,850	7,180	7,180
	IV class	0	0	3,850	7,180	7,180
	V class	0	0	0	0	0
	Totally transferred to specialized organization	0	0	3,850	7,180	7,180
	Among them for disposal	0	0	3,850	7,180	7,180
	Availability at the facility at the end of the reporting year	0	0	0	0	0

“Zheleznogorskiy” filiation

In 2022, 18.600 t of SMW had been totally generated and accordant to the contract transferred to RostTech LLC – the regional operator.

The type of waste generated with its FCCW code indication along with its generation standard numbers are represented in the table below:

Waste type	FCCW code	Generation standard, tons/year
Wastes from office and utility spaces, unsorted (excluding oversized)	7 33 100 01 72 4	5,400

The dynamics of the SMW management is represented in the Table 13.

Table 13

The dynamics of the SMW management in “Zheleznogorskiy” filiation during 2018 – 2022 period						
	Indice	2018	2019	2020	2021	2022
	Totally generated, of these:	5,820	5,820	5,820	5,400	18,600
	IV class	5,400	5,400	5,400	5,400	18,600
	V class	0,420	0,420	0, 420	0	0
	Totally transferred to specialized organization	5,820	5,820	5,820	5,400	18,600
	Among them for disposal	5,820	5,820	5,820	5,400	18,600
	Availability at the facility at the end of the reporting year	0	0	0	0	0

“Severskiy” filiation

During 2022, 2.700 tons of MSW were totally formed as a consequence to the office premises activities, and thereafter transferred accordant to the contract to ABF Sistem LLC – the regional operator.

Waste removal from the territory of the DDF is performed by the specialized organization ABF Sistem LLC accordant to the contract of 18.04.2022. Waste generated in the rented office premises in accordance with the lease agreement from 21.03.2022 is removed by the lessor Dom-8 LLC.

The type of generated waste with its FCCW code indication along with its generation standard numbers are represented in the table below:

Waste type	FCCW code	Generation standard, tons/year
Wastes from office and utility spaces, unsorted (excluding oversized)	7 33 100 01 72 4	2,750

The dynamics of operation and consumption waste along with SMW management are represented in the Table 14.

The dynamics of operation and consumption waste along with SMW management at “Severskiy” filiation during 2018 – 2022 period

Table 14

Indice	2018	2019	2020	2021	2022
Totally generated, of these:	1,345	1,533	1,800	2,700	2,700
I class	0,045	0,033	0	0	0
IV class	1,300	1,500	1,800	2,700	2,700
Totally transferred to specialized organization	1,345	1,533	1,800	2,700	2,700

Table 14	The dynamics of operation and consumption waste along with SMW management at “Severskiy” filiation during 2018 – 2022 period					
	Indice	2018	2019	2020	2021	2022
	Among them for disposal	1,345	1,533	1,800	2,700	2,700
	for recovery	0	0	0	0,038	0
	Availability at the facility at the end of the reporting year	0	0	0,038	0	0

The volume of unsorted waste generated due to work production of filiation’s office and household premises (excluding oversized) remained at the same level compared to 2021.

“Novouralskoe” subbranch of “Severskiy” filiation

8.20 tons of operation and consumption waste total were generated during 2022 due to “Novouralskoe” subbranch activities, of them:

- 1.15 tons of operational wastes have been transferred to SPETS-AVTOCOM LLC for recovery within the contract;
- 7.05 tons of SMW have been transferred to TBO EcoService LLC – the regional operator for disposal

The types of generated wastes with its FCCW code indication along with its generation standard numbers are represented in the table below:

Waste type	FCCW code	Generation standard, tons/year
Wastes generated produced by the filiation’s office and household premises (excluding oversized)	7 33 100 01 72 4	7,050
Construction and repair works garbage	8 90 000 01 72 4	1,000
Unsorted scrap and wastes containing uncontaminated ferrous metals in manufactures or fragments	4 61 010 01 20 5	0,150

The dynamics of operation and consumption waste along with SMW management are represented in the Table 15.

Table 15

The dynamics of operation and consumption waste management at "Novouralskoe" subbranch of "Severskiy" filiation during 2018 – 2022 period						
	Indice	2018	2019	2020	2021	2022
	Totally generated	0	0	7,311	2,000	8,200
	IV class	0	0	6,811	1,000	8,050
	V class	0	0	0,500	1,000	0,150
	Totally transferred to specialized organization	0	0	7,311	2,000	8,200
	Among them for disposal	0	0	5,800	1,000	7,050
	For recovery	0	0	1,511	1,000	1,150
	Availability at the facility at the end of the reporting year	0	0	0	0	0

Radioactive waste management

“Dimitrovogradskiy”, “Zheleznogorskiy”, “Severskiy” (and its “Novouralskoe” subbranch) NORWM filiations did not generate any solid radioactive waste (SRW) during 2022*.

*No solid radioactive waste is generated in the process of normal exploitation of RAW disposal facilities. SRW production may take place during repair and surface decontamination works, which are performed by specialized organizations consentient to contracts. To collect and temporarily store SRW all NORWM filiations and subbranch are fully equipped with the necessary instrumentation.

ULYANOVSK REGION

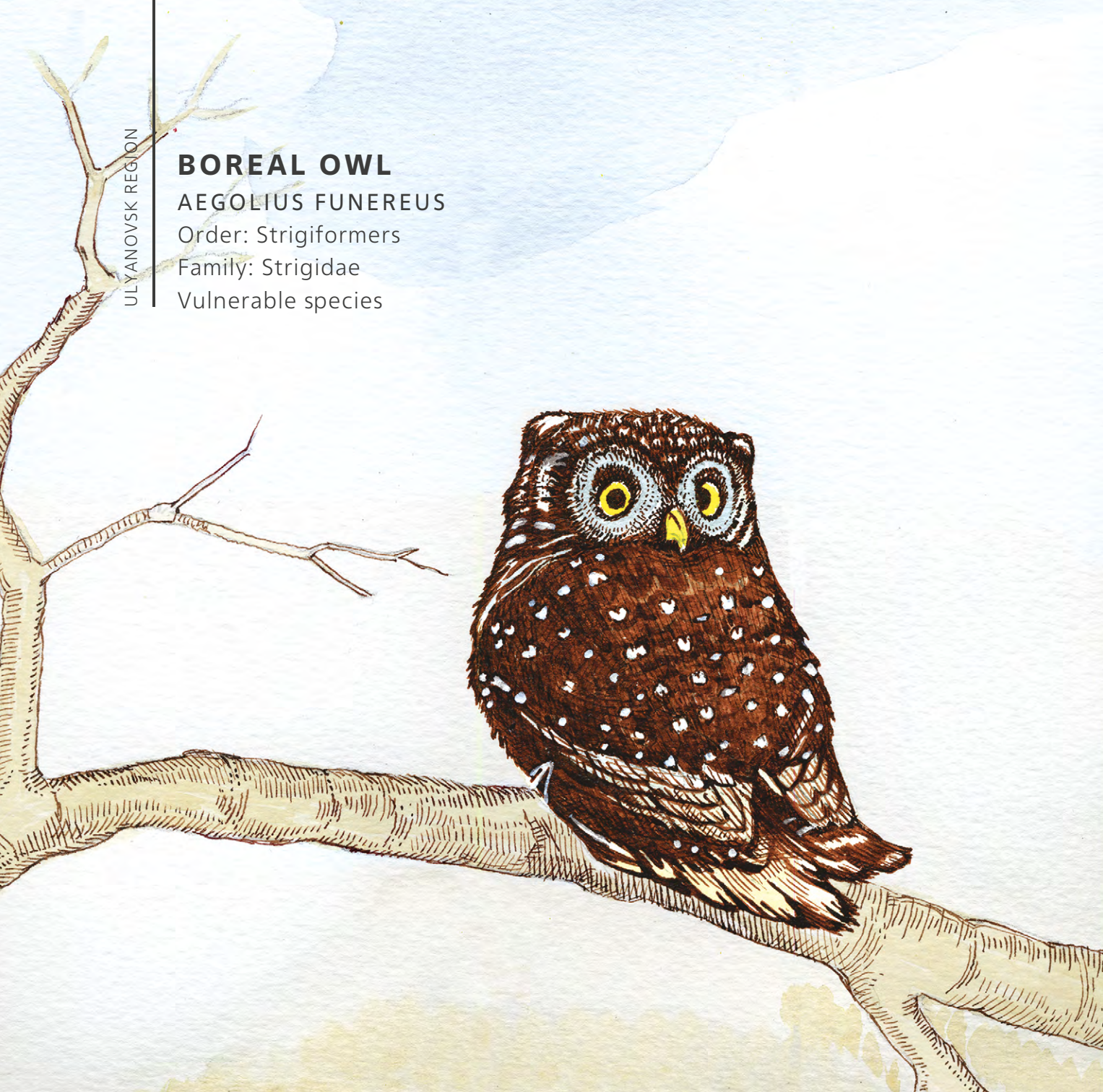
BOREAL OWL

AEGOLIUS FUNEREUS

Order: Strigiformers

Family: Strigidae

Vulnerable species



BOREAL OWL

AEGOLIUS FUNEREUS

BREEDS IN DENSE CONFIREOUS FORESTS. IT MAINLY EATS SMALL RODENTS AND BIRDS. A SECRETIVE BIRDE, LEADS A SEDENTARY AND NOCTURNAL LIFESTYLES, AVOIDS OPEN AREAS

ULYANOVSK REGION

6 SPECIFICAL GRAVITY OF EMISSIONS, DUMPING AND WASTE IN TOTAL VOLUME THROUGHOUT ENTIRE TERRITORY OF NORWM FILIATIONS AND SUBDIVISIONS

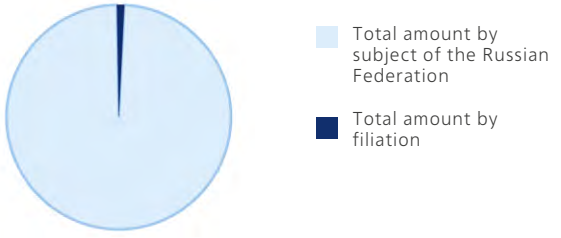
6.1. Emissions specifical gravity of pollutants into the atmospheric air

Data on the emissions ratio of “Zheleznogorskiy” NORWM filiation in the total volume at the territory of its location (Krasnoyarsk region) are represented in the Table 16.

Data on regional indicators are represented in the Public report on the state of environment and its protection in the Krasnoyarsk region for the year 2021, uploaded to the Krasnoyarsk region Ministry of Ecology and Environmental Management website to the "Basic Information” section.

Table 16

	Emissions ratio of “Zheleznogorskiy” NORWM filiation in the total volume at the Krasnoyarsk region			
	Indice	Gross amount through the federated entity *, thousands of tonnes	Intra-filiation gross amount, tonnes	Filiation specifical gravity, %
	Volume of pollutant emissions to the atmospheric air	2 418,5	2,5	0,000103



* due to the lack of statistical data on Krasnoyarsk region for 2022 by the time of the report's release, the general indicators for 2021 were used for representing of the comparable information

Figure 12. Unit weight of "Zheleznogosly" filiation emissions in total volume of Krasnoyarsk region

6.2. Specifical gravity of operation and consumption waste

Data on the NORWM's filiations and subbranch operation and consumption waste specifical gravity in its total volume trough the territories of their presence (in the Tomsk, Sverdlovsk, and Krasnoyarsk regions) are represented in the Table 17 and in the Figure 13.

Data on the regional indicators are represented in:

- in the Public report on the state of environment and its protection in the Krasnoyarsk region for the year 2021, uploaded to the Krasnoyarsk region Ministry of Ecology and Environmental Management website to the section: " Waste. Operation and consumption waste management".
- в in the Public report on the environmental state at the territory of Sverdlovsk region for the year 2021, uploaded to the official website of Ministry of Natural Resources and Environment to the section "Operation and consumption waste"
- in the environmental state report in Tomsk region for the year 2021, uploaded to the official website of the Department for Environmental Management and Protection Ministry of Natural Resources of Tomsk region to the section "Operation and consumption waste".

Table 17	Emissions and consumption ratio NORWM filiation in the total volume at the territories of their presence			
	Indice	Gross amount through the federated entity *, tonnes	Intra-filiation gross amount, tonnes	Filiation specifical gravity, %
	“Zheleznogorskiy” NORWM filiation (Krasnoyarsk region))			
	Volume of waste production	554 164,5 t	18,6 t	0,0000034
	“Novouralskoe” subbranch of "Severskiy" filiation (Sverdlovsk region)			
	Volume of waste production	174 100, 0 t	8,2 t	0,0000047
	“Severskiy” filiation (Tomsk region)**			
	Volume of waste production (SMW)	304 979 t	2,7t	0,000885

* due to the unavailability of statistical data for 2022 by the time of this report release the general indicators for 2021 were used for representing of the comparable information on the Krasnoyarsk, Sverdlovsk and Tomsk regions.
** calculation includes data on municipal solid waste (SMW) only

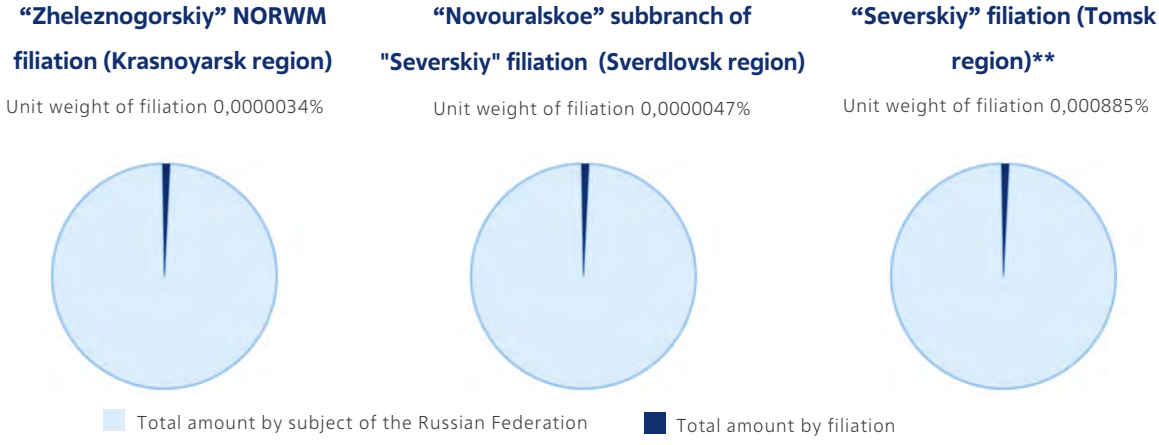


Figure13. Unit weight of production and consumption waste

NORWM's impact of on public health and various environmental components does not exceed the permissible levels of established radiation safety standards and hygienic-sanitary standards.

KRASNOYARSK REGION

YELLOW-BILLED LOON

GAVIA ADAMSII

Order: Gaviiformes

Family: Gaviidae

Rear species

YELLOW-BILLED LOON

GAVIA ADAMSII

IT LIVES IN THE COASTAL PLAINS

AND HILLY TUNDRA NEAR RESERVOIRS AND LAKES. THE

MAIN CONDITION FOR SURVIVAL IS THE PRESENCE OF

FISH

KRASNOYARSK REGION

7 AREAS CONTAMINATED DURING OPERATION ACTIVITIES

7.1. NORWM's territories of presence ecological state and conditions

In 2022, no cases of radionuclide contamination of NORWM territories of presence were registered. There are no operational sites among them contaminated with hazardous chemicals or radionuclides.

As it follows from long-term monitoring of the environment in the location area of the "Dimitrovgradsky", "Zheleznogorskiy" and "Severskiy" filiations, liquid radioactive wastes are safely allocated in geological horizons and does not have any direct impact on the surface, underground waters are safely allocated in geological horizons and does not have any direct impact on the surface, underground waters or other environmental objects.

According to the environmental objects in the vicinity of Novouralsk NSDF with its surrounding areas samples analyses results for the period of 2015-2022 (atmospheric air, snow cover, soil, vegetation, underground and surface water, etc.), this object causes no environmental impact.

7.2. Contaminated lands rehabilitation, forest regeneration (upon existence)

In the process of the construction works elaboration on the creation of RAW final isolation facilities (in the vicinity of Zheleznogorsk, Seversk and Ozersk towns), the territory is being cleared and the soil cover is being reduced by the removal of a surface layer, and trees are being cut down. At the same time, the reduction of the soil cover is local. The removed soil is used for backfilling. After the construction works completion, landscaping and soil reclamation procedures will be executed.

EURASIAN BITTERN

BOTAURUS STELLARIS

Order: Pelecaniformes

Family: Ardeidae

Exceedingly rare and vulnerable species

EURASIAN BITTERN

BOTAURUS STELLARIS

LIVES AT WETLANDS FULL OF REEDS. A SECRETIVE, NOCTURNAL BIRD.

THE MALE SPECIES HAS VERY LOUD CRY, SPREADING FOR 2-3

KILOMETERS. IT FEEDS ON SMALL FISH, AMPHIBIANS

KRASNOYARSK REGION

8 BIODIVERSITY CONSERVATION ACTIVITIES

RAW final isolation facilities construction works being elaborated near the towns of Zheleznogorsk, Seversk and Ozersk are associated with the local flora and fauna impact.

Environmental protection measures fulfilment at construction works sites makes possible achieving of the minimal impact on wildlife and vegetation, assessing it as moderate and local. At the same time, there is no impact on rare and endangered species, as well as species included into the Red Books, due to their absence at construction sites.

SVERDLOVSK REGION

OSPREY

PANDION HALIAETUS

Order: Accipitriformes

Family: Pandionidae, the only kind

Rear species

OSPREY

PANDION HALIAETUS

THE BIRD IS AN ICHTHYOPHAGE. IT FEEDS ON FISH, DIVING FOR IT TO A DEPTH OF 2 M. THE FEATHERS HAVE A WATER-REPELLENT STRUCTURE, AND SPECIAL VALVES CLOSE THE NOSTRILS WHEN DIVING.

IT LIVES NEAR RESERVOIRS, IN SWAMPY AREAS, IN REMOTE AND INACCESSIBLE AREAS OF FORESTS

SVERDLOVSK REGION

9 KEY ACTIONS TAKEN TO ACHIEVE AND FINANCE ENVIRONMENTAL TARGETS

9.1. Environmental cost structure

A large number of environmental measures was kept in 2022. The environmental protection funds were spent on the ensuring the environment's radiation safety, along with the waste management and other NORWM's activity areas. The cost structure is represented in the Table 18.

In 2022, the filiations/subbranch basis of cost structure (as well as in 2021) consisted of arrangements, aimed at the environmental radiation safety insurance. Environmental protection activities costs amount increased for the reporting period. The changes were cased inter alia by the in additional equipment purchase cost increase.

9.2. Environmental impact fee structure

"Zheleznogorskiy" NORWM filiation handled the payment of a fee on the atmospheric pollutant emissions for the radioactive waste storage facility in Krasnoyarsk region, Nizhnekanskiy massif (NEI № 04-0124-002171-P) a as part of an underground research laboratory construction sight. The amount of the fee in 2022 equaled 946.00 RUB.

Table 18

Environmental protection funds cost structure for the period 2021 – 2022			
Year	Environmental protection activity total costs, RUB	Environmental protection activity total costs, RUB	Environmental service costs, RUB
“Dimitrovgradskiy” filiation			
2022	67 415,00	61 026,00	6389,00
2021	65 004,00	58 476,00	6528,00
“Zheleznogorskiy” filiation			
2022	162 539,00	154 174,00	8365,00
2021	148 673,00	142 837,00	5836,00
“Severskiy” filiation			
2022	201 246,00	115 074,00	86 172,00
2021	196 597,00	107 390,00	89 207,00
“Novouralskoe” subbranch of the "Severskiy" filiation			
2022	50 816,00	41 970,00	8846,00
2021	22 279,00	12 674,00	9605,00
NORWM total			
2022	482 016,00	372 244,00	109 772,00
2021	432 553,00	321 377,00	111 176,00

9.3. Information on investments in fixed assets for environmental purposes

There were no investments in basic capital for environmental purposes in the reporting period.

TOMSK REGION

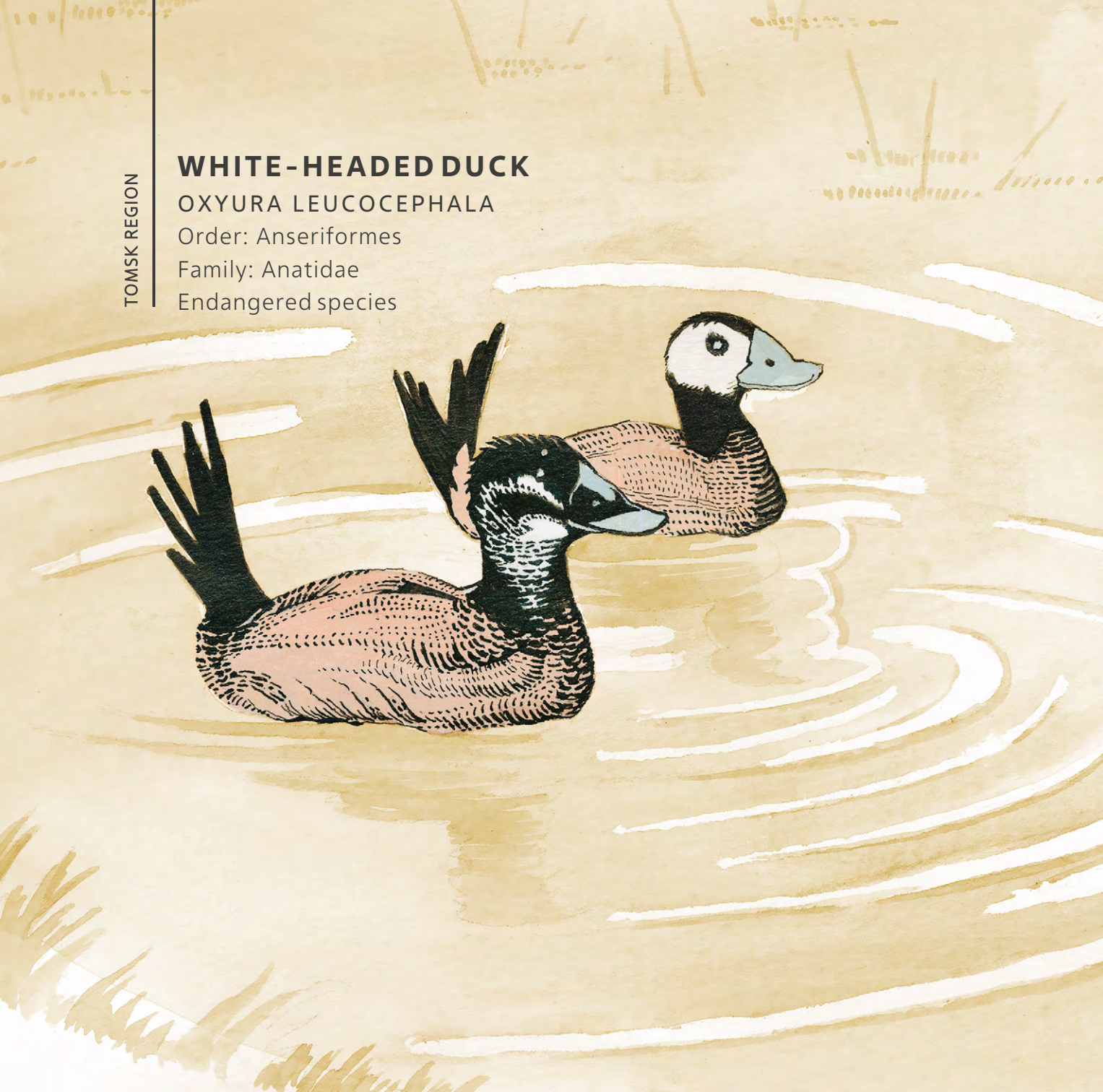
WHITE-HEADED DUCK

OXYURA LEUCOCEPHALA

Order: Anseriformes

Family: Anatidae

Endangered species



WHITE-HEADED DUCK

OXYURA LEUCOCEPHALA

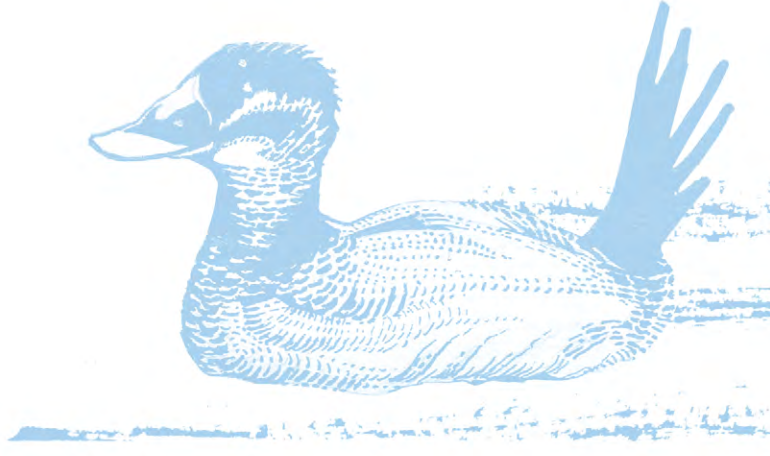
IT LIVES ON THE WATER, WHERE IT BUILDS ITS NESTS FROM REEDS. IT IS ONE OF THE FEW BIRDS WITH THE SMALLEST WINGS THAT HAS RETAINED THE ABILITY TO FLY

TOMSK REGION

10 ENVIRONMENTAL ACTIVITIES AND THEIR EFFECTS

According to the “Plan on the negative environmental impact minimization until 2025", approved by the ROSATOM’s order of 29.03.2021 No. 1-1/197-R (as amended by the order of 17.11.2022 No. 1-1/776-P) there were no environmental protection measures planned for implementation in 2022.

NORWM farther developed and approved (by Order of 30.08.2021 No. 319-01/712-P) the “Programme of energy saving and its efficiency improvement” for 2022-2026.



11 SOCIAL, ENVIRONMENTAL AND EDUCATIONAL ACTIVITIES

11.1. 11.1. Interaction with public authorities and local governments. Key events of 2022

The principal interaction way between NORWM, Public authorities and municipal governments is the coordination of RAW final isolation plans and strategy, including the communication work of the enterprise. At the same time, the National Operator is in a continuous interaction with regulatory and licensing organizations.

The key events of 2022 became the receipt of a licence (of 21.04.2022 No. GN-03-304-4212) on the RAW storage facility operation at the site of of near-surface RAW disposal facility in Novouralsk along with the permit on the facility's second construction stage commissioning.

Beyond that, the following actions were conducted within the framework of licensing and permitting activities:

- materials, substantiating the licence for the construction of a non-nuclear storage facility for RAW, created in accordance with the design documentation for the construction of facilities for RAW final isolation (Krasnoyarsk region, Nizhnekanskiy massif) as part of an underground research laboratory (including

materials of environmental impact assessment), were sent for the State Environmental Review;

- NORWM received Amendment No. 3 to the licence of 16.07.2018 No. GN-03-304-3538 on the Operation of a stationary facility and auxiliary buildings preassigned for RAW disposal of the “Zheleznogorskiy” NORWM filiation: liquid radioactive waste deep disposal facility “Severniy” landfill” on the elimination of the monitoring wells N-7, P-7 and D-1a and construction of monitoring wells N-7K, P-7K and D-1aK;
- NORWM submitted the applications for obtaining of new licenses for the liquid radioactive waste deep disposal facilities at “Zheleznogorskiy”, “Dimitrovgradskiy”, “Severskiy” NORWM filiations operation in connection with the expiration of the current licenses of 16.07.2018 No. GN-03-304-3538, No. GN-03-304-3539 and No. GN-03-304-3540 in 2023.

During 2022, the State supervisory and control bodies of the Russian Federation’s executive authorities (Rostekhnadzor, Federal Medical-Biological Agency and Ministry of Emergency Management) carried out inspections of NORWM’s filiations and subbranch operation processes for assessing the current state of nuclear and radiation safety, safety of construction and installation work, sanitary-hygienic, industrial and fire safety. 58 inspections were conducted by the State supervisory and control bodies for the reporting period.

11.2. Interaction with public environmental organizations, scientific and social institutions of public information. Key results for 2022

In terms of informing the population about environmental safety when handling radioactive waste in accordance with Federal Law No. 190-FZ "On the Management of Radioactive Waste NORWM regularly conducts events for representatives of public and media in Sverdlovsk, Chelyabinsk, Tomsk, Ulyanovsk and Krasnoyarsk regions.

58 INSPECTIONS WERE CONDUCTED BY THE STATE SUPERVISORY AND CONTROL BODIES FOR THE REPORTING PERIOD

Ecology Week project implementation continued in order to improve environmental literacy of the regions residents where NORWM operates in 2022. The project’s main task is discussion of topical issues, related to NORWM activities and Unified State System for Radioactive Waste Management creation with the

representatives of public interest groups and media. A meeting of public opinion leaders and experts was held in Novouralsk, Sverdlovsk region in 2022. Participants of the event discussed technological, social and environmental aspects of NORWM's activities, during the technical tour stakeholders visited RAW disposal facility site for the 3rd and 4th classes of radioactive waste in the vicinity of Novouralsk town.

IN 2022, NORWM SPECIALISTS ORGANIZED AND CONDUCTED IN GENERAL 27 TECHNICAL TOURS TO THE RADIOACTIVE WASTE DISPOSAL FACILITIES SITES AND TO THE SITES OF ITS CONSTRUCTION, ALONG WITH HOLDING OF 24 ROUND TABLES IN THE REGIONS OF NORWM PRESENCE

In summer were held traditional public presentations and discussions of NORWM's Environmental Safety Report for the year 2022 with the participation of a number of stakeholders. The publication of this annual document is fulfilled in line with ROSATOM's Environmental policy in the field of public reporting implementation.

In 2022, NORWM specialists organized and conducted in general 27 technical tours to the radioactive waste disposal facilities sites and to the sites of its construction, along with holding of 24 round tables in the regions of NORWM presence.

In 2022, the practice of cooperation with educational institutions has been successfully continued. The educational project for school students "Simply about radiation" got the award of the municipal environmental competition "Green owl-2022".

In 2022, stakeholders were presented with the fourth film of the documentary series about the radioactive waste final isolation system creation and specialized facilities construction in the Russian Federation.

"Refuge for the Atom. 10 years on the security guard" film sums up the results of the decade since the creation of NORWM, following the dynamics of the Unified State System for Radioactive Waste Management creation.

Another challenging area of NORWM's external communications became the development of cooperation with public councils of various institutional affiliations. Inter alia, members of the regional and local public councils took part in NORWM's round tables held in Ulyanovsk, Sverdlovsk, Tomsk, and Krasnoyarsk regions. Public council of Novouralskiy urban district continued its practice of environmental monitoring of RAW disposal facility preassigned for 3rd and 4th classes of waste.

Farther we lay down an enlarged list of events organized by the NORWM in 2022, with division by the region of operational activity.

Hereinbelow we bring forward the other activities in the regions of NORWM presence, which were held in 2022:

Sverdlovsk region

A series of round tables and press line-ups were held for the stakeholders, regional and local authorities, media, and expert community representatives.

We organized our typical lessons "Simply about ecology" in Novouralsk Secondary School No. 54. The studies were held in summer camp, where middle-class pupils learned using a dose-rate meter and applied this knowledge into practice practice by measuring radiation level at the schoolyard.

A number of public and media representatives got involved into environmental monitoring of RAW disposal facility (in the t of Novouralsk vicinity). Water samples were taken before the second construction stage commissioning and next time few months as after the commissioning started.

A technical tour to the RAW disposal facility was organized for the delegation from Belarus, headed by Mikhail Mikhadyuk, Deputy Minister of Energy of the Republic of Belarus. Within this visit, the Belarus delegates had been demonstrated the first and second stages of the storage facility, along with the facility's receipt control zone.

In short

- 9 technical tours to the RAW disposal facility site for the 3rd and 4th classes of radioactive waste were organized;
- 5 issue-related round tables were held (presentation of the environmental report, discussion within the framework of the conference "Ecology week," summing up the results of the year, following the participation of public members in environmental monitoring of the repository, a press line-up with the media);
- overall 43 materials were published in the media (33 articles in newspapers and online publications, 10 TV-stories, 6 topic-based airs and daily information messages about the radiation background on the radio in Novouralsk).

The Report's presentation on Environmental safety took place in t of Novouralsk. NORWM's environmental division specialists reported the representatives of expert community, stakeholders and local journalists about the main guidelines of NORWM facilities environmental monitoring.

NORWM held the third Ecology Week in 2022. RAW disposal facility site for the 3rd and 4th classes of radioactive waste was visited by the representatives of Chelyabinsk, Tomsk, Ulyanovsk, and Krasnoyarsk regions. The delegates were shown the receipt control building, containers with RAW dosimetry process and operation of RAW packages loading to the storage facility. After the technical tour end, the participants of the event discussed various aspects of RAW final isolation challenges.

The team of the National Operator for Radioactive Waste Management received the award of the municipal environmental competition "Green owl-2022" in the nomination "Social environmental initiatives" for the implementation of "Simply about radiation" project in Novouralsk.

Tomsk region

A series of round tables on various aspects of NORWM activities was organized for the representatives of the public, scientific community, and media of Tomsk region.

Employees of the “Severskiy” filiation at the site of the Atomic Energy Information Center in Tomsk held a a number of meetings with the region residents, where dispelled myths about RAW, talked about the challenges of RAW final isolation in Russian Federation, storage safety systems, set of environmental and radiation monitoring efforts carried out by NORWM and regulatory agencies.

NORWM experts took part in the Conference "Environmental geochemistry" participating in round table: "Decommissioning of nuclear and radiation hazardous facilities and development of closed nuclear cycle technologies" held by Tomsk Polytechnic University.

A cooperation agreement was signed with Tomsk Polytechnic University. Among the main goals of the agreement is focusing of intellectual and organizational resources for training specialists and scientists, along with research and development of pilot projects, aimed on the support and provision of nuclear and radiation safety.

In short

- for the first time was organized a technical tour to the facilities of “Severskiy” NORWM filiation in the Tomsk region;
- 4 issue-related round tables were organized (environmental report presentation, based on the filiation’s radioecological monitoring results, technical tour to the filiation’s facilities, press line-up on the results of yearlong work);
- 5 outreach projects were implemented;
- 48 materials were published in the media;
- on the air of “Tomsk time” TV channel was demonstrated the 4th part of "Refuge for the Atom" film.

NORWM organized a technical tour to the facilities of the enterprise's "Severskiy" filiation for the representatives of public and media of Tomsk region. The participants of the event visited the site of liquid radioactive waste deep disposal facilities (in operation since 1963), and RAW disposal facility site for the 3rd and 4th classes of radioactive waste construction site.

Master class "Issues of radioactive waste final isolation. What is being built in Seversk today" for the students of Tomsk State University was held in 2022. The event took place at the Tomsk media center RIA as part of a cooperation agreement between NORWM and Tomsk State University (TSU).

Within the Ecoclub of Tomsk State University was held a lecture on the topics of special aspects of radioactive waste isolation in Russian Federation and NORWM facilities security systems.

NORWM became a partner of the XIX annual journalistic skills regional competition "Sharks of the Pen-2022," organized by the Russian Journalists Union Tomsk regional branch.

For the regional mass media representatives, was held a seminar on the results of NORWM activities in 2022.

Ulyanovsk region

NORWM conducted technical tours for the representatives of public and authorities, scientific community, environmental organizations, specialists in the field of rational environmental management and environment protection, journalists to the LRW DDF at the JSC "SSC RIAR" territory.

As part of cooperation agreement on interaction with field-oriented universities, for the students of Dimitrovgrad Engineering and Technological Institute of the National Research Nuclear University MEPhI was organized a technical tour to the LRW DDF for the first time. The students also visited one of the observation wells of the deep disposal facility and learned about the subsoil state environmental monitoring procedure conduction.

The National Operator for Radioactive Waste Management organized a technical tour for the representatives of administration and environmental chamber of Dimitrovgrad city to the LRW DDF. The attendees explored one of four injection wells and central control panel of the DDF, learned about the environmental monitoring procedure.

The media representatives and teachers of technology park "Quantorium" of Ulyanovsk region visited the experimental-industrial landfill.

In short

- 3 technical tours were held at the “Dimitrovgradskiy” NORWM filiation facilities;
- 4 issue-related round tables were held (environmental report, two round tables with the representatives of authorities, public, expert community and media of Dimitrovgrad on the topic of environmental and radiation control, environmental monitoring, and a press line-up);
- 5 outreach projects were implemented;
- 25 materials were published in the media (6 newspaper articles, 9 online-publicized articles, 10 TV-stories).

In 2022, NORWM team conducted active outreach work with school audiences in Dimitrovgrad. Radioecological literacy lessons for primary school pupils were held at City Lyceum No. 25. For the students of 10-11grades was shown the film "Shelter for the Atom" and was given a lecture on the National Operator for Radioactive Waste Management activities topic. For the students of Dimitrovgrad technology park “Quantorium” were held lessons “Simply about radiation” by the specialists of NORWM. Likeways, the expert of NORWM filiation’s Information center spoke out at the “GreenScience” forum, organized by the infant technology park “Quantorium”.

On the results of NORWM activities in 2022 was organized a seminar for the regional media representatives.

Throughout the reporting year, employees of the filiation’s Information center organized a number of round tables together with the specialists of NORWM’s Public relations and media department on various aspects of NORWM activities for the representatives of stakeholders, scientific/expert community, and media of Ulyanovsk region.

NORWM became a partner of the “Eco-Citizen” photo competition, organized by the “Environmental Protection Service” of Dimitrovgrad.

Chelyabinsk region

NORWM specialists conduct continuous information work in the Chelyabinsk region and Ozersk town for the representatives of local authorities, media and stakeholders on the topic of safety when handling radioactive waste. Among other factors, Chelyabinsk delegation took part in the third conference “Ecology week”.

Representatives of the public, regional/local authorities and the media visited the operating radioactive waste disposal facility for RAW of 3rd and 4th classes, located near Novouralsk town in Sverdlovsk region.

In short

- 3 round tables were held (presentation of a report on environmental safety, summing up the results of the year, along with a press line-up);
- 12 materials were published in the media (in printed and online form), 2 television stories were released.

Krasnoyarsk region

“Zheleznogorskiy” filiation

“Zheleznogorskiy” NORWM filiation celebrated the 55th anniversary of LRW DDF “Severniy” landfill. For the veterans of “Severniy” – NORWM employees and employees of Mining and Chemical Combine (FSUE MCC), directly involved into the facility’s evolution, was held a ceremonial meeting in the office of Zheleznogorsk administration, along with an excursion to the “Severniy” LRW DDF and NKM-laboratory construction site.

From September 29 to October 28, public discussions in the form of a survey took place in accordance with the decree of Zheleznogorsk Closed Administrative-Territorial Unit (CATU) administration of September 15, 2022 No. 1887 “On the realization of public discussion on the object’s state enviromental assesment - licence supporting materials for construction of radioactive waste storage facility not related to nuclear installation, created in accordance with the design documentation for the construction of radioactive waste final isolation facility (Krasnoyarsk region, Nizhnekanskiy massif) as a part of URL (including preliminary materials for environmental impact assessment)”.

As a part of public discussions, round tables were held with the involvement of stakeholders’ representatives, media and expert community.

A number of agreements, including one on strategic partnership and cooperation between NORWM and Krasmash JSC (Krasnoyarsk mechanical engineering plant), was signed this year. The subject of the agreement became the unification of parties efforts for analyzing and usage of Krasmash JSC technical solutions and developments in the realization of transport and technological schemes of RAW management at particular stages of underground research laboratory operation.

The agreement was preceded by a visit to the facility's construction site of regional business representatives.

A NORWM exposition was created in the city museum of Zheleznogorsk – a special platform for interactive communication between residents, city's guests and experts on the topic of RAW safe isolation, along with the discussion of environmental issues and urgent problems. The project got the name "Submersion".

Cooperation development with the universities of Krasnoyarsk region

Students of the Siberian Federal University and Siberian State University of Science and Technology named after Mikhail Reshetnev academician (hereinafter SSUST) completed their internships at "Zheleznogorskiy" NORWM filiation. Future specialists in the field of technosphere and environmental safety, along with newcomer public relations specialists, got their first professional experience in the Engineering support department and Information center of LRW DDS "Severniy".

A workshop on the topic: "Communications in the field of radioactive waste management" was held in SSUST. NORWM's specialists held a meeting with the students of the Social Engineering Institute. The event took place within the framework of

In short

- 14 technical tours were held at the NORWM "Zheleznogorskiy" filiation facilities;
- 8 issue-related round tables were organized (environmental report, public discussions, year-end conclusive press line-up for the media, etc.);
- 9 outreach projects were implemented;
- 33 materials were published in the media (10 articles in printed newspapers, 13 articles were released as Internet online publications, 6 TV-stories, 4 radio programmes).

tthe strategic partnership and cooperation Agreement between Siberian State University and the NORWM, one of the Agreement's objectives is building of a dialogue with the Krasnoyarsk region public on the matter of nuclear energy use and RAW safe management.

In 2022, it was decided that a new discipline – "Radiation Safety" course will be brought to the University's programme starting from the spring semester of 2023 within the Cooperation Agreement between NORWM and SSUST framework. Pavel Butorov, the Head of radiation, industrial, fire safety and labor protection department of "Zheleznogorskiy" NORWM filiation will prelect a course of lectures. The audience of the course – 2nd grade students of the "Technosphere safety" faculty, future specialists in the field of practical environmental activities.

NORWM supports students' creativity. As a part of "YARPIAR" festival competitive programme students of Public relations faculty from Moscow State University, Tomsk State University, St. Petersburg State University of Technology, and other universities of the country solved NORWM's communication case on the topic of URL creation information support project, framed by the Nizhnekanskiy rock massif. Best students teams were awarded prizes from NORWM.

Outreach events

NORWM acted on behalf of a partner at Zheleznogorsk Youth day celebration. The “Experimentarium” platform was unfolded in the park. As part of the entertaining and educational quest local people learned a number of interesting facts about nuclear energy and RAW safe handling, tried to be scientists, synthesizing new chemical elements, measuring background radiation or musicians, composing a melody on a lithophone made of test cores from the “Yeniseiskiy” site located amidst of Nizhnekanskiy rock massif.

The fourth cycling quest, dedicated to upcoming Nuclear industry worker's day, took place in Zheleznogorsk. The event was organized by the Information center of “Zheleznogorskiy” NORWM filiation and Krasnoyarsk Atomic energy information center. Students of Children's Ecological and Biological Center, city’s secondary school pupils, local Young guard activists, along with the rest interested Zheleznogorsk residents became the participants of the event held at the territory of a park.

NORWM organized an issue-related evening "Nuclear geology" at Krasnoyarsk Atomic energy information center. The scientists of Nuclear Safety Institute of Russian Academy of Sciences together with the Central Siberia Museum of Geology (“GEOS”) experts discussed the Siberian region’s rock massive unique qualities and potential addressing to RAW safe isolation issues with the Krasnoyarsk local community representatives.

11.3. Development of international cooperation in the technological sphere and environmental safety issues. Key events in 2022

NORWM international cooperation is aimed at providing information on the compliance of enterprise’s activities with the accepted international standards, scientific and technical experience exchange in the field of RAW management, along with the demonstration of RAW final isolation facilities safe operation practical examples to international and Russian internal public.

During the reporting year, NORWM specialists took part in the International Atomic Energy Agency events series on the issues of environmental and radiation safety:

- Technical Meeting on Status and Trends in Spent Fuel and Radioactive Waste Management;
- First Coordination Meeting on Radiation Protection to Control the Exposure of the Public;

- Workshop on the Implementation of the International Radiation Monitoring Information System;
- Regional Coordination Meeting on Improving Environmental Monitoring and Assessment for Radiation Protection in Europe and Central Asia
- Seventh Review Meeting of the Contracting Parties to the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management
- Technical Meeting on the Coordination of Activities and Projects to the Safety of Geological Disposal

Furthermore within the reporting period:

- **19 – 21 April** was held a technical tour for the government delegation representatives of Belarus to the NSDF in Novouralsk;
- **2 – 4 August** NORWM specialists took part in the international conference "State and Prospects for the Development of Infrastructure for the Decommissioning of Nuclear and Radiation Hazardous Facilities, Radioactive Waste and SNF Management in the CIS Member States", held in Moscow.
- **20–22 November** a reduced replica of NSDF in Novouralsk was presented at the international industry forum "ATOMEXPO" in Sochi within "Environment" section.

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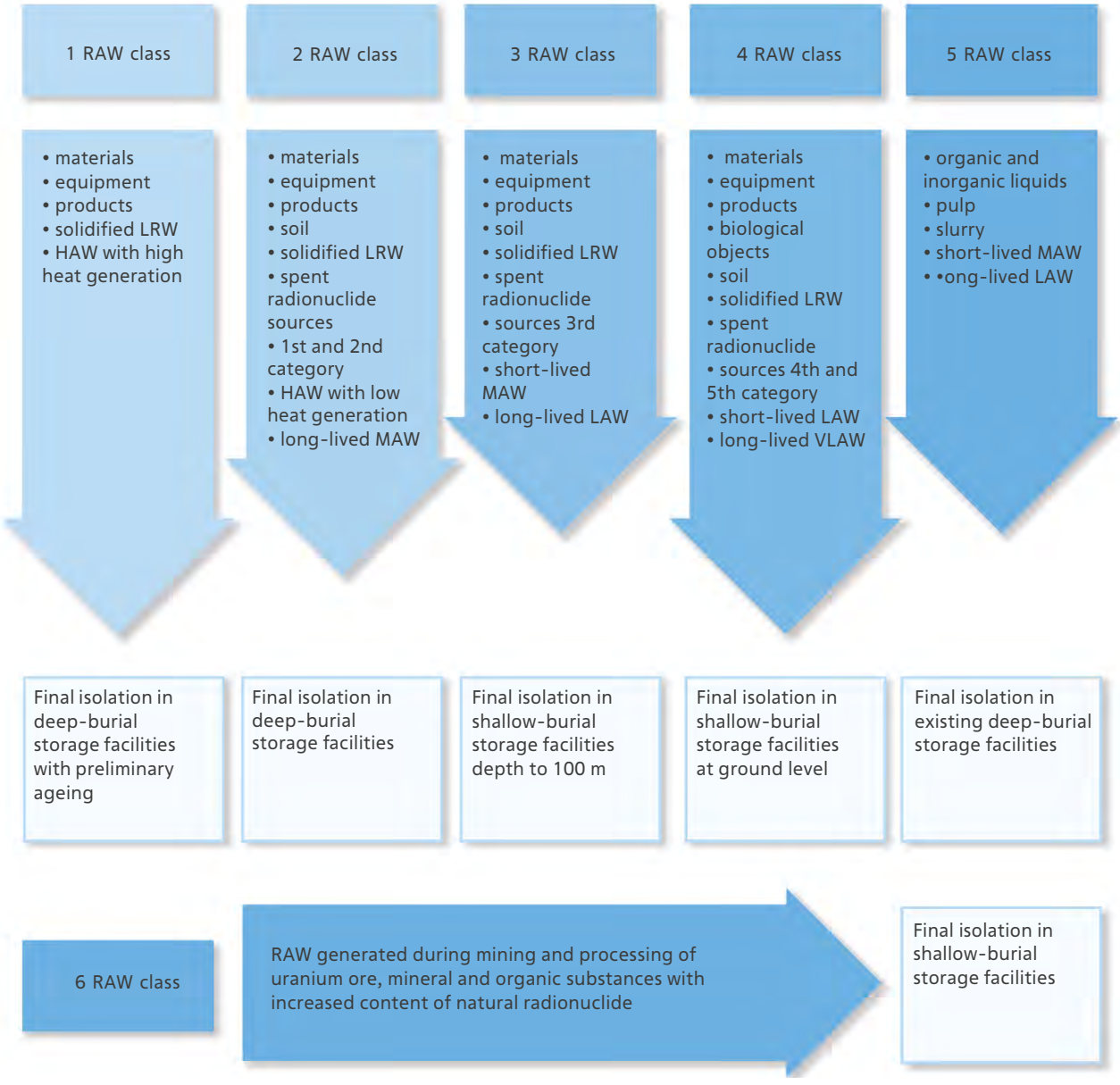
ANNEX

Annex 1

Radioactive waste

Radioactive waste – materials and substances that are not subject to further use, as well as equipment, products (including spent sources of ionizing radiation), the content of radionuclides in which exceeds the levels established in accordance with the criteria established by the Government of the Russian Federation. Radioactive waste can be recognized as materials with a high content of natural radionuclides, produced during non-atomic energyrelated activities for the extraction and processing of mineral and organic raw materials with a high content of natural radionuclides, if these materials are not to be further used.

RAW is classified as follows::



Annex II

Ensuring safety in the process radioactive waste disposal. System of protective barriers

RAW disposal method, containment structure, composite and properties of safety barriers are defined depending on RAW characteristics and volume, considering the natural conditions of disposal site location and the results of safety assessment in accordance with NP-055-14 requirements.

Radioactive waste of 3rd and 4th classes are subjected to disposal in near-surface facilities, placed above the ground surface level, or at the ground level, or lower than the ground surface level at depths up to one hundred meters.

RAW disposal facility's safety is provided due to successive implementation of in-depth multi-barrier protection principles, based on deployment of physical barriers systems at the propagation path of ionizing radiation and radioactive substances in the environment.

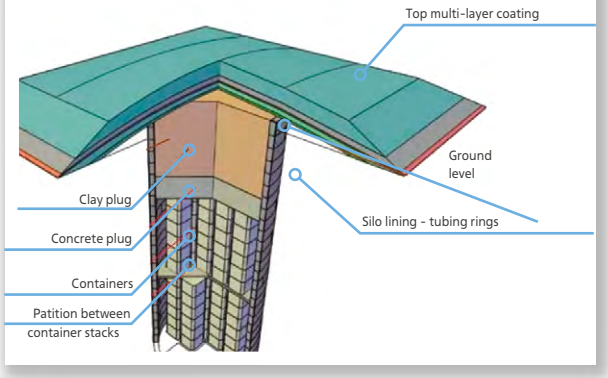
Safety in the process of RAW disposal is mostly implemented by using of multi-barrier protection principle, when disruption of one safety barrier (natural or engineer) or exogeneous natural or anthropogenic event does not cause disposal system's long-term safety level decrease.

The engineer barriers for disposal facility include RAW packaging, its particular elements (type of RAW, container type), disposal facility engineering structures and their specific parts and elements including construction facilities, buffer materials, basement and insulating screens.

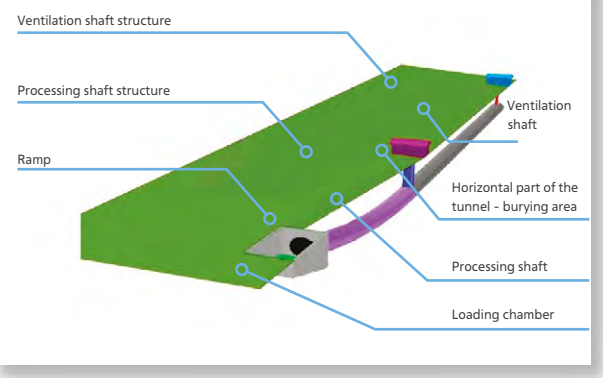
RAW disposal facility's natural barriers refer to natural geological formations including hosting rocks.

Now are available the following types of RAW 3rd and 4th classes disposal facilities design options:

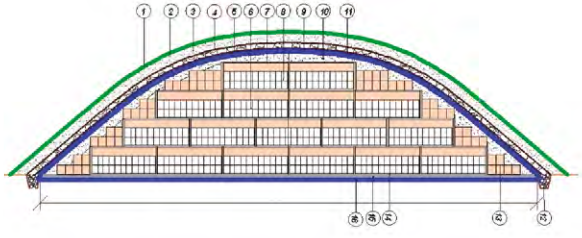
1.Silo type



2. Shaft or tunnel type

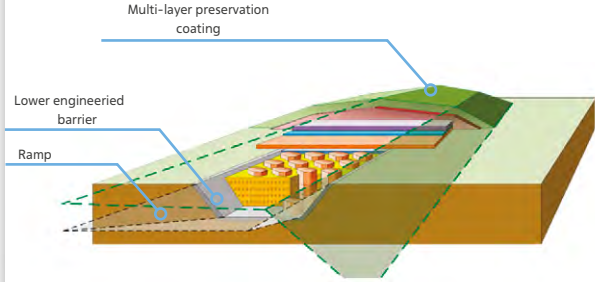


3. Mound-type facilit

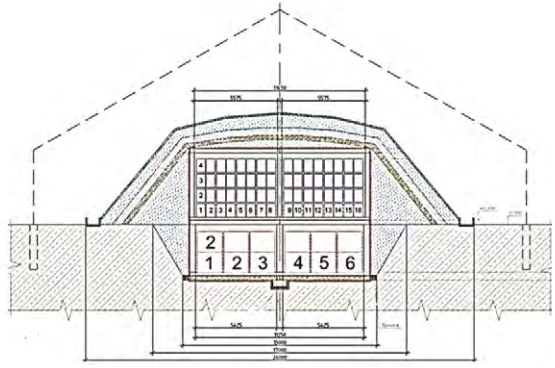


1 — grass reinforcement;
2 — natural layer 0,1m;
3 — natural soil 0,9 m;
4 — quarry stone protection layer 0,5 m;
5 — crushed stone 0,3 m;
6 — 20-feet containers with 4 class waste (OHRAW);
7 — contaminated soil;
8 — 4 class waste (OHRAW) in 200 steel barrels;
9 — bentonite mat 2 layers;
10 — levelling layer of sand 0,7 m;
11 — geogrid;
12 — drain trench;
13 — Big Bags with contaminated soil;
14 — reinforced concrete foundation;
15 — crushed stone 0,3 m;
16 — bentonite mat 2 layers.

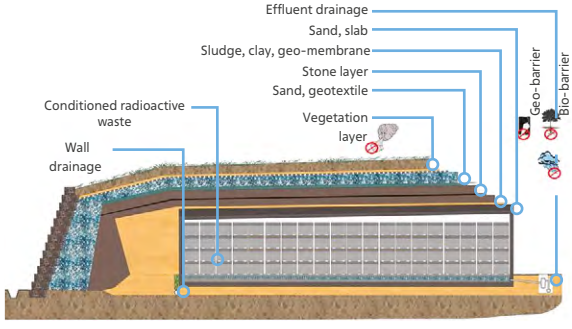
4. Trench-type



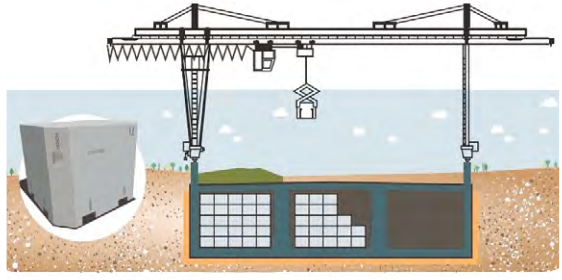
5. Combined type



6. Modular structure with covering screen (above-ground facility)



7. Modular structure (underground facility)



Liquid radioactive waste deep disposal facility (LRW DDF) engineering barrier system consists of:

- LRW DDF wells casing, water-proof across the entire depth, hindering the low-laying aquifers break-through into upper-laying ones, provided with the engineering barrier of 100 years service period minimum;
- wells annular channel investment materials with conductivity coefficient not exceeding that of aquitards, drilled through by the well of 100 years service period minimum;
- backfill materials parameters are chosen and substantiated in the wells and LRW DDF shut-in project documentation.

LRW DDF natural barriers refer to natural geological formations – host rock, constituted by reservoir beds and aquicludes.

Annex III

Radioactive waste disposal overseas

According to best global practices radioactive waste disposal in specialized facilities is acknowledged to be the safest way of RAW isolation. NORWM maintains contacts with all countries, involved into the final stage of radioactive waste management. in all options that ultimately include the stage of radioactive waste management.

Experience exchange and knowledge synthesis are important results of research by specialists in the global atomic field, addressing future generations' environmental well-being issue.

More complete information about NORWM cooperation with foreign organizations and regulatory bodies in the field of radioactive waste management can be found on the website http://norao.ru/international_activity/ in the "International cooperation" section.

Also, information about radioactive waste and spent nuclear fuel international disposal practices is posted on the website http://nkmlab.ru/mezhdunarodnyy-opyt/ in the "International experience" section.

Here is the list of main foreign regulators and operators:

- Belgium: Belgian Agency for Radioactive Waste and Enriched Fissile Materials (ONDRAF/NIRAS) - https://www.ondraf.be/
- The Great Britain: Office for Nuclear Regulation (ONR) - http://www.onr.org.uk/
- France: The National Radioactive Waste Management Agency (ANDRA) - https:// international.andra.fr/
- Switzerland: Nagra (National Cooperative for the Disposal of Radioactive Waste) - https://www.nagra.ch/
- Germany: Federal Company for Radioactive Waste Disposal (BGE) -https://www. bge.de/en/bge/
- The Netherlands: The Central Organisation for Radioactive Waste (Centrale Organisatie Voor Radioactief Afval, or COVRA) - https://www.covra.nl/
- Sweden: Svensk Kärnbränslehantering AB (Swedish Nuclear Fuel and Waste Management Company) - https://www.skb.com/
- Canada: Nuclear Waste Management Organization (NWMO) - https://www.nwmo. ca/