



UECP  
ROSATOM

**ENVIRONMENTAL  
SAFETY  
REPORT**

**2020**



UECP  
ROSATOM



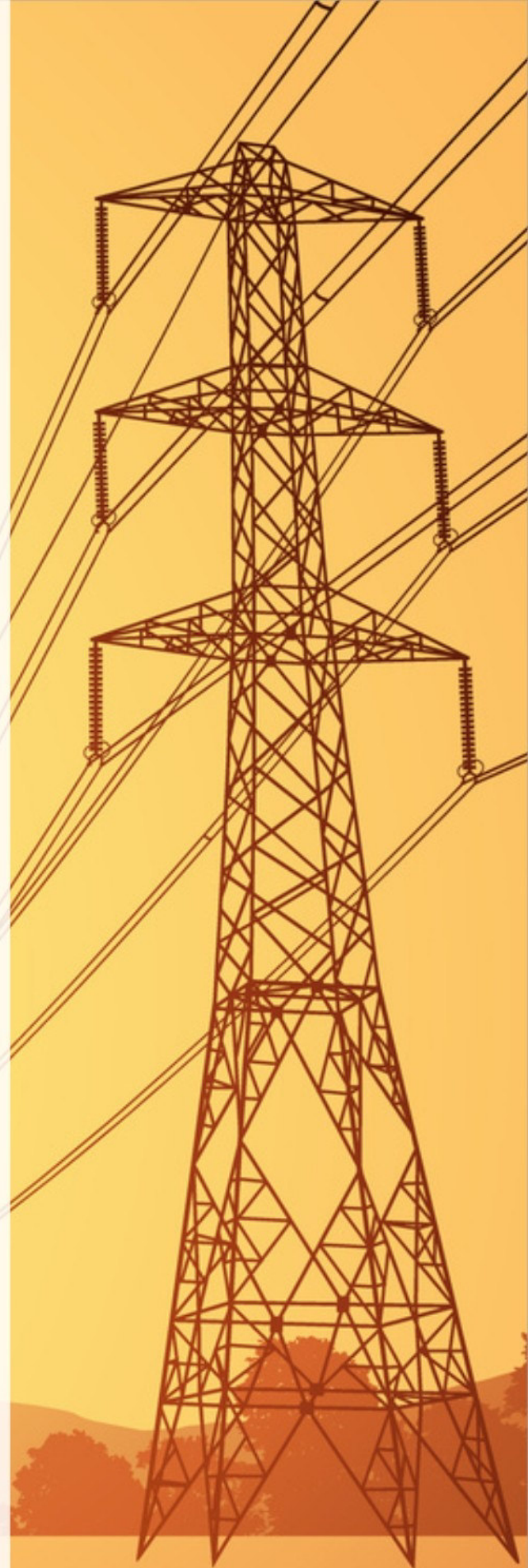
2020

## FOREWORD

Public Environmental Safety Report 2020 is the twelfth annual environmental report prepared on a voluntary basis by Urals Electrochemical Plant Joint Stock Company and addressed to the wide range of interested parties. The report contains data on UECP JSC environmental activities, environmental safety of production and environmental impact.

Unfortunately, the last year 2020 turned out to be a tough time for everyone due to COVID-19 pandemic. Adherence to the quarantine restrictions, entered to prevent from the virus spread, had a great impact on each business across all industries. Almost all public events, including environmental actions, have been cancelled or rescheduled. Nevertheless, it should be noted that UECP JSC has completed the package of environmental safety measures in due order. The company environmental impact is, as before, at stably low level. There were no infringements of regulatory legal acts in the field of ecological safety.

This report was prepared with the support of "Children's art school", Municipal Budgetary Institution for Supplementary Education of Novouralsk urban district. The works of talented school students devoted to our native city of Novouralsk, are shown in the report. The pictures of our city, of the world around us will be presented as viewed by the eyes of children. It's the way our youngsters imagine this world.



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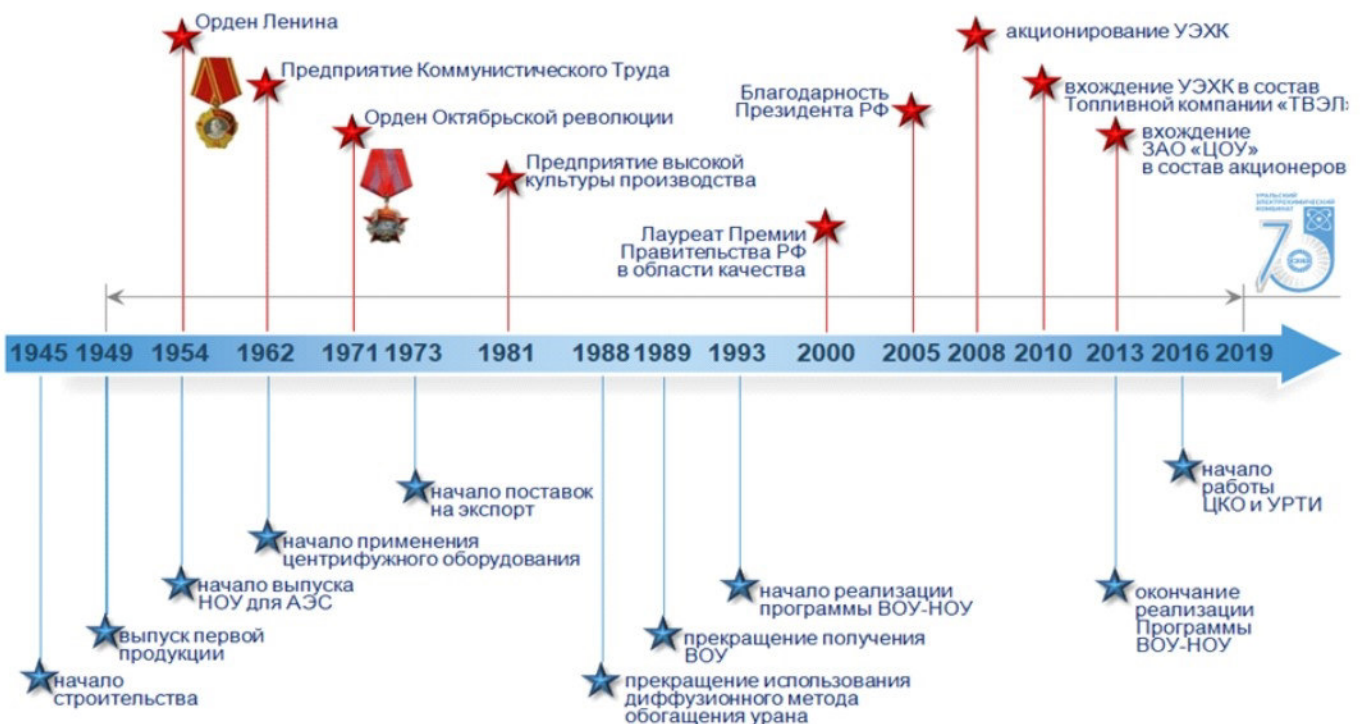
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# UECP JSC background information and core business



In 1945 the USSR Soviet of People's Commissars took the decision to start the construction of gas diffusion plant in Sverdlovsk-44 located in Sverdlovsk region. The Plant was designed for producing highly enriched uranium (HEU) under the Soviet nuclear weapons program. In 1949 Urals Electrochemical Plant was put in operation. It was the first in the USSR industrial company providing commercial uranium isotope separation using gas diffusion method. To meet the needs of nuclear power industry (reactors, offshore power plants, research reactors and nuclear power plant reactors) the production of low enriched uranium (LEU) started in 1954.



In 1962 the first in the world centrifuge uranium enrichment plant was commissioned. It appeared to be the important milestone in raising efficiency of UECP enrichment production. It was underpinned by the well-established team of UECP experts and qualified personnel steadily providing the advanced level of enrichment production. In 1966 the plant reconstruction program started, and by 1988 the gas diffusion equipment was completely replaced by the centrifuges. It made possible to reduce the power consumption of separation production by a factor of 10 resulting in twofold or threefold increase of enrichment capacity.

In the early seventies UECP entered the international market and since then, it has exported low enriched uranium to the companies in France, Germany, Belgium, England, the USA, South Korea, Sweden, Spain, Finland, Switzerland, Italy, Argentina. In 1989 UECP ceased the generation of weapon-grade uranium. Pursuant to intergovernmental agreements on reduction of nuclear weapons UECP initiated HEU conversion into fuel for nuclear power plants in 1995. For this purpose UECP developed and introduced the special HEU-LEU technology.



Conversion



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Centrifugal uranium enrichment

## UECP JSC Position in the Rosatom Nuclear Fuel Cycle

On August 15, 2008 Federal State-owned Unitary Enterprise Ural Electrochemical Integrated Plant was reorganized into Joint-Stock Company Ural Electrochemical Integrated Plant.

The company key milestone was its incorporation into ROSATOM TVEL Fuel Company in 2010. TVEL Fuel Company comprises separation-sublimation combine, gas centrifuge production, fabrication of nuclear fuel and research & development cluster. It enabled further effective development of the Company, its production facilities, infrastructure and human resources.

As from 2015 in accordance with the Russian Federation law the full commercial name of the Company is Urals Electrochemical Plant Joint-Stock Company (UECP JSC).

UECP JSC is located in the industrial area of Novouralsk city in Sverdlovsk region, 80 km north-west of Yekaterinburg. Two settlements share borders with the Company: Novouralsk city (about 81 000 residents) and Verkh-Neivinsky settlement (about 5 000 residents).

UECP JSC is one of the key players in the Russian nuclear fuel cycle, holding intermediate position between uranium mining and fuel fabrication for nuclear reactors.

TVEL Fuel company of Rosatom



Production of powder



Fabrication of pellets

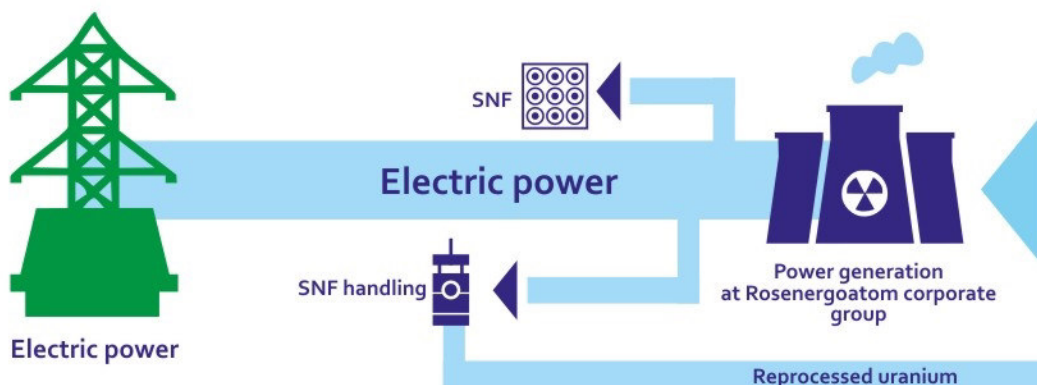


Fabrication of fuel assemblies



NPP design and construction, nuclear engineering

Reprocessed uranium



At present UECP JSC is the largest uranium enrichment company not only in Russia, but also in the world. The Company enrichment production applies highly effective and reliable gas centrifuge technology. The following companies represent enrichment production of Russia and apply the same technology:

- Electrochemical Plant, Joint-Stock Company, (ECP), Zelenogorsk, Krasnoyarsk region
- Siberian Chemical Plant, Joint-Stock Company, (SCP), Seversk, Tomsk region
- Joint-Stock Company Angarsk Electrolysis Chemical Plant (AECP) Angarsk, Irkutsk region.

**Natural uranium consists of three radioactive isotopes:**



Today the most part of nuclear power reactors run on uranium fuel enriched in U-235. The Russian enriched uranium export contributes to balancing global energy mix and is of the same importance as the Russian gas and oil export.

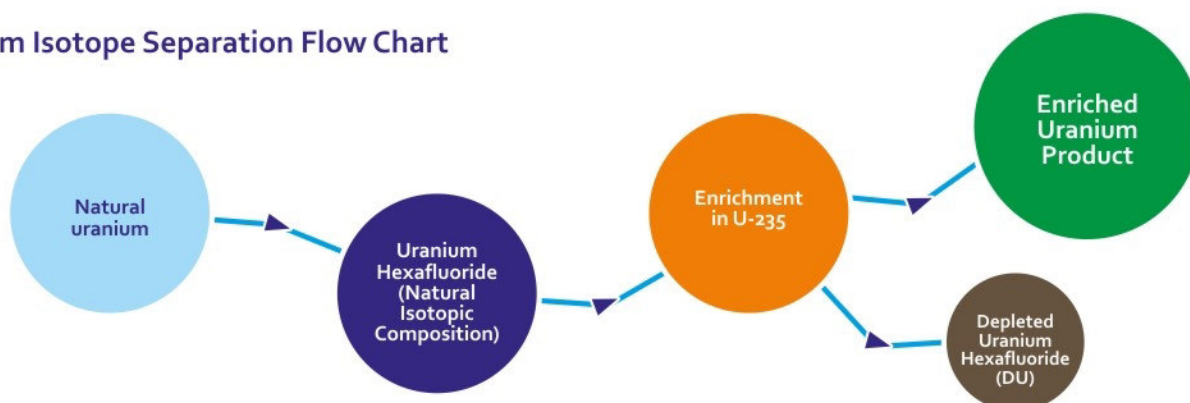
The heart of UECP JSC structure is the production cluster consisting of process shops 53, 54, 87, and directly associated subdivisions: analytical center (department 16), chemical metallurgical shop (shop 70), machinery revision shop (shop 19) and special product storage, transportation and control department (department 7). The gas centrifuge cascades are located in shops 53, 54, 87. "Chelnok" facility in shop 54 is used for transfer of uranium hexafluoride of required U-235 assay into the cylinders of foreign customers.

The chemical metallurgical shop deals with enrichment production waste processing (extraction, precipitation, vessel washing, U3O8 fluorination, solid radioactive waste conditioning, metal waste preparation), operation of process pulp filtration unit, preparation of solid radioactive waste delivery to State Unitary Enterprise "National operator for radioactive waste management" (SUE NO RWM). Equipment decontamination and process equipment repair are conducted in the machinery revision shop.

Analytical center performs analytical procedures and produces certified reference materials of uranium isotopic and chemical composition.

Special product storage, transportation and control department ensures nuclear material storage and transportation and performs some operations related to nuclear material control and accounting.

### Uranium Isotope Separation Flow Chart



The natural uranium is converted into uranium hexafluoride for the enrichment process.

The enrichment process results in generation of enriched uranium product (EUP) and depleted uranium hexafluoride (DU).

EUP is delivered to the customer, and DU is delivered for storage and further processing.

Environmental management is a part of corporate governance system which has well-shaped organizational structure and is aimed to achieve the environmental policy objectives by means of implementing environmental programs.

## UECP JSC management system



Environmental management concept is based on sustainable development. In 1992 in Rio de Janeiro the summit of state heads was held. It was devoted to sustainable development of human society and nature, and adopted Agenda 21 with general provisions of the new concept being suggested to all countries of the world. The summit concluded that environmental management shall be treated as the key dominant of sustainable development and the highest priority for industrial operations and business.

In 1993 in the course of the Uruguay Round negotiations devoted to establishment of the World Trade Organization, it was decided to introduce the new environmental international standards.

International Standardization Organization (ISO) issued ISO 14000 standards specifying the concept of environmental management system.

UECP JSC management system has been certified against the following standards as part of Rosatom TVEL Fuel company integrated management system



### Environmental management system ISO 14001

- Environmental protection as management task
- Improvement of environmental performance
- Reduction of environmental risks

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- ISO 9001:2015
- ISO 14001:2015
- ISO 50001:2011
- ISO 45001:2018

One of the key parameters of the Company sustainable development is the effectiveness of Quality management system (QMS) that covers the whole life cycle of the products from development to implementation, and ensures faultless operation of all production process chains. UECP JSC QMS is being constantly improved: from zero-defect production, complex quality control system to QMS implementation, certification and performance starting from 2004 according to ISO 9001.

The technology of enriched uranium transfer into the transport cylinders of international customers was developed in 1973.



Over the whole period of export activities the Company received no claims related to the supplied products quality.

## STRATEGIC GOAL

## ENSURING SAFE AND SUSTAINABLE DEVELOPMENT, MINIMIZATION OF PRODUCTION ENVIRONMENTAL IMPACT

UECP JSC management system has been established and certified in accordance with international standards. It is maximally customer-oriented and focused on understanding the needs and expectations of all interested parties, continuous improvement of business processes and implementation of system approach to company management.

The Company management system (MS) is a part of general UECP JSC management system, and a part of TVEL Fuel Company corporate management system and Rosatom State Corporation MS arranged according to "the system of systems" principle. Integrated MS comprises Quality management system (QMS), Environmental management system (EMS), Occupational health & safety management system (OH&S MS), Energy management system (EnMS), and meets the requirements of ISO 9001:2015, ISO 14001:2015, ISO 45001:2018, ISO 50001:2018 international standards.

The compliance was proved by the certificate № TIC 15 100 52672/10 - TIC 15 104 10699/10 - TIC 15 116 11266/10 - TIC 15 275 14075/10. The certificate was issued 28.08.2018 and according to the results of extension witness audit was renewed 20.10.2020 and certified by TÜV Thüringen, Jena, Germany certification body. Scope of certification: production, supply and storage of uranium enriched to less than 65% for power and research reactors; maintenance and test of shipping packaging sets for uranium hexafluoride.



Safety culture and Rosatom production system, financial management, legal affairs, asset management and other management areas are integral to the company MS.

Product quality and process safety assurance and improvement are the key issues of the Company operation and development.

## UECP JSC MS certification history:

- 2004 – certification of conformity with ISO 9001:2000
- 2009 – certification of conformity with ISO 9001:2008
- 2010 – certification of conformity with ISO 14001:2004
- 2013 – certification of conformity with BS OHSAS 18001:2007
- 2014 – certification of conformity with ISO 50001:2011
- 2018 – certification of conformity with ISO 9001:2015, ISO 14001:2015
- 2020 – certification of conformity with ISO 45001:2018, ISO 50001:2018

In 2020 UECP JSC accepted for execution ISO 19443:2018 "Quality management systems – Specific requirements for the application of ISO 9001:2015 by organizations in the supply chain of the nuclear energy sector supplying products and services important to nuclear safety (ITNS)", and also commenced development, introduction and preparation for certification of UECP JSC security management system for the supply chain according to ISO 28000:2007 "Specification for security management systems for the supply chain".

Management system audits in UECP JSC subdivisions, subsidiaries and affiliates, vendors of services/products are conducted according to the schedule.

## Therefore, at present UECP JSC integrated management system includes:

- Environmental management system intended to improve procedures that ensure environmental safety
- Quality management system intended to improve procedures that ensure the product high quality
- Occupational health & safety management system established for the Company employees
- Energy management system intended to improve procedures that ensure energy saving and conservation of natural resources.

**Integrated management system has been implemented and maintained in all UECP JSC subdivisions providing quality and operational safety at all stages of production.**



Systematic mitigation of environmental and social impact is determined as the key priority of UECP JSC environmental policy. When planning its activities, the Company takes into consideration the interconnection of environmental and production issues. UECP JSC employees are aware of their responsibility for work towards decreasing environmental footprint.

**In pursuance of ROSATOM State Corporation environmental policy UECP JSC management complies with the following key principles:**

- presumption of potential environmental hazard in planning and carrying out activities
- permanent readiness of UECP JSC management and personnel to prevent and mitigate emergency situations and other accidents
- coincidence of environmental, economic and social concerns of UECP JSC and population non-governmental organizations, governmental authorities and local authorities for the purpose of sustainable development and promotion of favorable environmental and ecological safety
- ensuring high environmental performance, mitigation of UECP JSC environmental impact and natural resources utilization at reasonable costs
- transparency and availability of the information related UECP JSC operations in the field of environmental protection and ecological safety.

**UECP JSC main tasks in the field of environmental protection and ecological safety:**

- meet the requirements of international, federal and regional legislation, rules and guidelines in the area of radiation and nuclear safety, environmental protection, sanitary-and-epidemiological well-being of population, protect population in natural and man-made emergency situations, and other commitments undertaken by UECP JSC
- develop the natural environment and radiation control and monitoring systems using advanced automatic equipment and software
- improve the resource- and energy efficiency of production
- ensure decommissioning of UECP JSC nuclear facilities being out-of-service
- reduce the volume of radioactive and hazardous industrial waste
- regularly inform UECP JSC personnel, citizens and other interested parties of environmental and radiation situation and UECP JSC environmental impact
- continuously improve the integrated management system as required by ISO 9001, ISO 14001, OHSAS 18001, ISO 50001, IAEA GSR Part 2, IAEA GS-G-3.1.

UECP JSC environmental policy was first introduced on April 22, 2008 by UECP JSC General Director order. Since then the Company environmental policy was annually revised and updated.

The current revision of UECP JSC environmental policy was introduced on January 10, 2019 by UECP JSC General Director order and was approved by ROSATOM State Corporation and TVEL JSC. The Company environmental policy is available in mass media and on the UECP JSC web-site.



- Constitution of the Russian Federation
- Federal Law on Environmental Protection No 7-FZ of January 10, 2002
- Federal Law on Ecological Assessment No 174-FZ of November 23, 1995
- Federal Law on Ambient Air Protection No 96-FZ of May 4, 1999
- Water Code of the Russian Federation No 74-FZ of June 3, 2006
- Federal Law on Production and Consumption Waste No 89-FZ of June 24, 1998
- Federal Law on Sanitary and Epidemiological Well-being of Population No 52-FZ of March 30, 1999
- Federal Law on Radiation Safety of Population No 3-FZ of January 9, 1996
- Federal Law on Nuclear Energy Use No 170-FZ of November 21, 1995
- Federal Law on Radioactive Waste Management and Amendments to Certain Legislative Acts of the Russian Federation No 190-Z of July 11, 2011
- Federal Law on Underground Resources No 2395-1 of February 21, 1992
- Sanitary Rules SP 2.6.1.2523-09 of July 7, 2009 NRB-99/2009 Radiation Safety Standards
- Sanitary Rules SP 2.6.1.2612-10 of April 26, 2010 «Basic Sanitary Rules for Radiation Safety» (OSPORB-99/2010)

Furthermore, the Company activities in the field of radiation, nuclear and environmental safety are regulated by the Russian Federation governmental rules, statutory standards, sanitary rules, norms, guidelines and other regulatory documents, issued by the government of the Russian Federation, ministries, departments, state regulatory authorities within their competence.

### The list of the Company main authorization documents in the field of environmental protection

UECP JSC has got all necessary permits in accordance with the applicable environmental legislation of the Russian Federation, including:

- certificates of public registration of environmentally hazardous facilities
- permits for emissions of polluting chemical substances and radionuclides
- limit for production and consumption waste disposal
- certificates for hazardous production and consumption waste
- water use agreement
- decisions on the granting of water bodies for use
- licenses for nuclear energy use
- other documents

Contractors that provide services and perform works at the Company site also have got the complete set of necessary permits and licenses.

# 5

## Industrial ecological control and environmental monitoring

### 5.1

### UECP JSC site conditions

There are no areas polluted by radionuclides at UECP JSC industrial site and sanitary protection area. Gamma-radiation equivalent dose rate does not exceed the natural background. The average value makes 0.06  $\mu\text{Sv}/\text{hour}$ . Over the whole period of UECP JSC operations there were no cases of environmental contamination caused by emergencies, spills, etc. Pursuant to the "Decision on establishing category of UECP JSC potential radiation hazard as per Principal Sanitary Radiation Safety Rules (OSPORB-99/2010)" approved by the RF FMBA territorial body, UECP JSC was assigned the III category of potential radiological hazard. Therefore, the control area for UECP JSC is not determined. The sanitary protection area for UECP JSC, as the nuclear hazardous facility, is specified by "Project for UECP JSC sanitary protection area" and approved by the Head of Novouralsk urban district and UECP JSC General Director. The Company site total area makes 512.3 hectares. The Company land assets do not include the conservation areas and valuable biodiversity territories.

The following monitoring objects within UECP JSC monitoring area are:

- water bodies of the open hydrographic system
- atmospheric air
- vegetation
- atmospheric precipitation (snow)
- radiation environment
- meteorological parameters

UECP JSC performs monitoring of radiation, ecological situation and natural environment using three systems:



**ARMS**  
Automated radiation monitoring system



**EMS**  
Environmental monitoring system



**SMS**  
Subsurface monitoring system



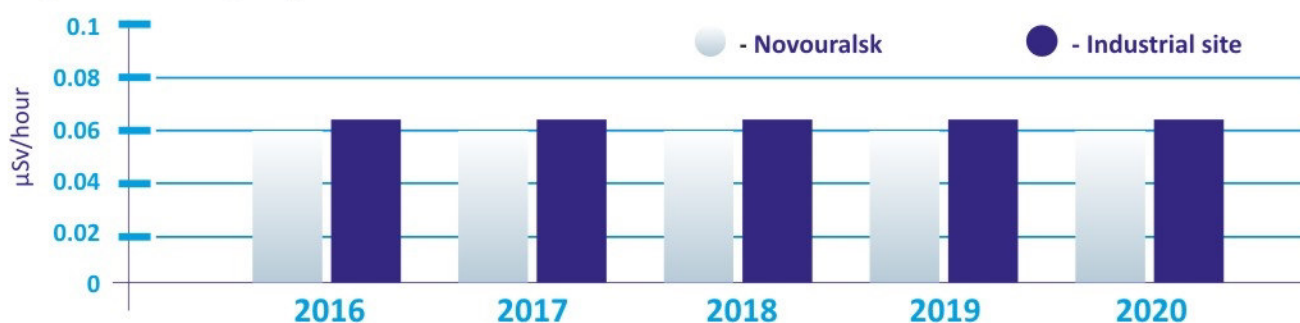
## ARMS. Radiation monitoring and meteorological observations

Control of radiation situation is ensured by Environmental protection department (EPD) using automated radiation monitoring system (ARMS), being a part of ROSATOM unified state automated radiation monitoring system. The system is designed for ensuring continual automatic monitoring of radiation and meteorological conditions in monitoring stations connected with the control panel. At present UECP JSC automated radiation monitoring system is equipped with the most advanced equipment.

Nine monitoring stations cover all UECP JSC industrial sites. The measuring data of equivalent gamma-radiation dose rate received by UECP JSC automated radiation monitoring system are daily transferred to FSUE "ROSATOM Situation-crisis center". Thereafter these data shall be available on the web-site [www.russianatom.ru](http://www.russianatom.ru).

According to the results of regular laboratory measurements the content of radioactive substances in atmospheric air and in water objects is stably low and has no tendency to increase. The exposure dose rate at the Company industrial sites and in Novouralsk does not exceed 0.15  $\mu\text{Sv}/\text{hour}$ , which is well below the standard values and background exposure dose rates specified for Urals region.

**Diagram 1. Average equivalent dose rate**



## Monitoring of the natural environment

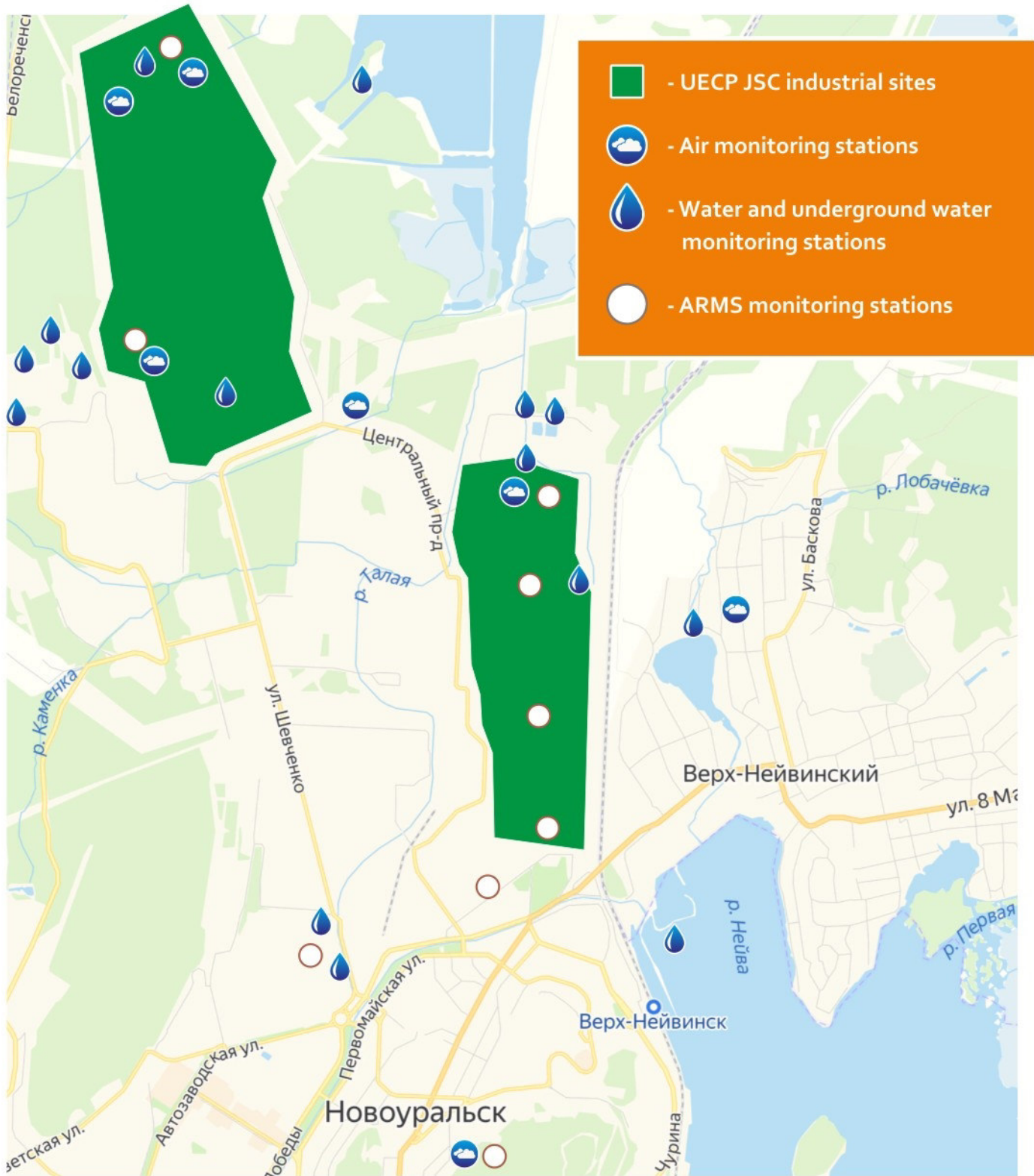
Industrial environmental control and ambient monitoring is carried out by the Company Environmental protection department. Environment radiation monitoring is performed by UECP JSC Analytical center personnel. The chemical content analysis is performed by a number of certified companies according to concluded contracts.

UECP JSC Analytical center is equipped with the most advanced instruments, equipment and measuring devices for sampling and analysis of environmental samples. For example, determination of uranium isotope content in the natural environment locations shall be performed by mass-spectrometric analysis using modern mass-spectrometers manufactured by the leading global producers of analytical equipment.

### Results of long-term measurements show that:

- the content of radionuclides in ambient waters is ~150 times below the sanitary limits.
- the content of radionuclides in Novouralsk and UECP JSC site atmospheric air does not exceed the background level and is ~270 times below acceptable limit.
- the radionuclide content in soil does not exceed the background level.

## UECP JSC environmental monitoring locations



Over the long-term period of monitoring (since 1960) the content of chemical pollutants (including uranium compounds and other heavy metals) as well as radionuclides in UECP JSC ambient environment has not exceeded the background level and has no tendency to increase.

## 5.4 UECP JSC subsurface monitoring

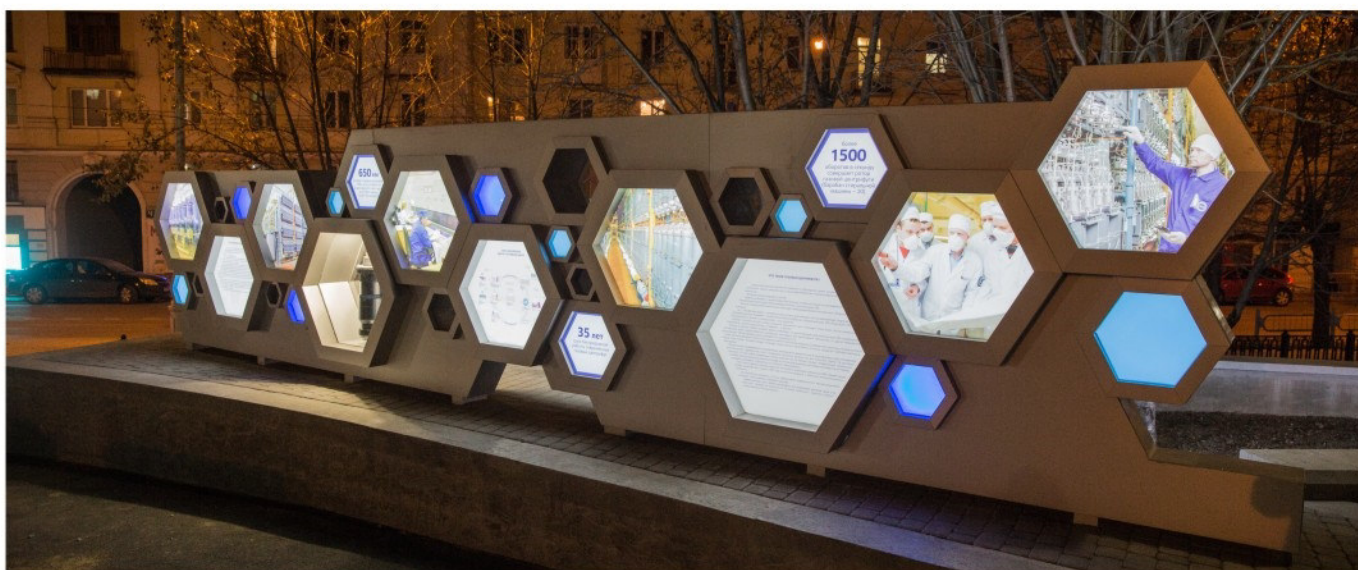
Since it became necessary to determine the laws of dynamics, the structure and chemical composition of underground waters in order to monitor the quality of the Company's ambient waters and technical water supplied to the process facilities, the Company created the network of monitoring wells and stations keeping track of the hydrodynamic status and water quality of water-bearing layers. The methods, techniques and equipment for wells installation and connection, sampling and water sample analysis procedures, and other operations were tested.

At present the introduced brand new subsurface monitoring system makes it possible to obtain correct and complete information on the state of underground hydrosphere. At the same time the system serves as a resource for establishing a basis of the future integral information-analytical system of radiation ecological monitoring (IAS REM) at ROSATOM State Corporation enterprises.

Arrangement of subsurface state monitoring system included geologic and geodesic research of UECP JSC radioactive waste storage locations, camera treatment of research performed during the previous years. The research of change in geocological indicators was conducted, the analysis of the site geological and hydro-geological structure was performed, geological and hydro-geological cross sections were prepared. This work resulted in establishment of UECP JSC underground water observation well network which includes 43 operating wells. The geoinformation system was established. 21 wells at I-IV industrial sites and 5 wells at VI-VII industrial sites were additionally drilled in 2020 in terms of subsurface monitoring system improvement. The commissioning of these wells is scheduled for 2021.

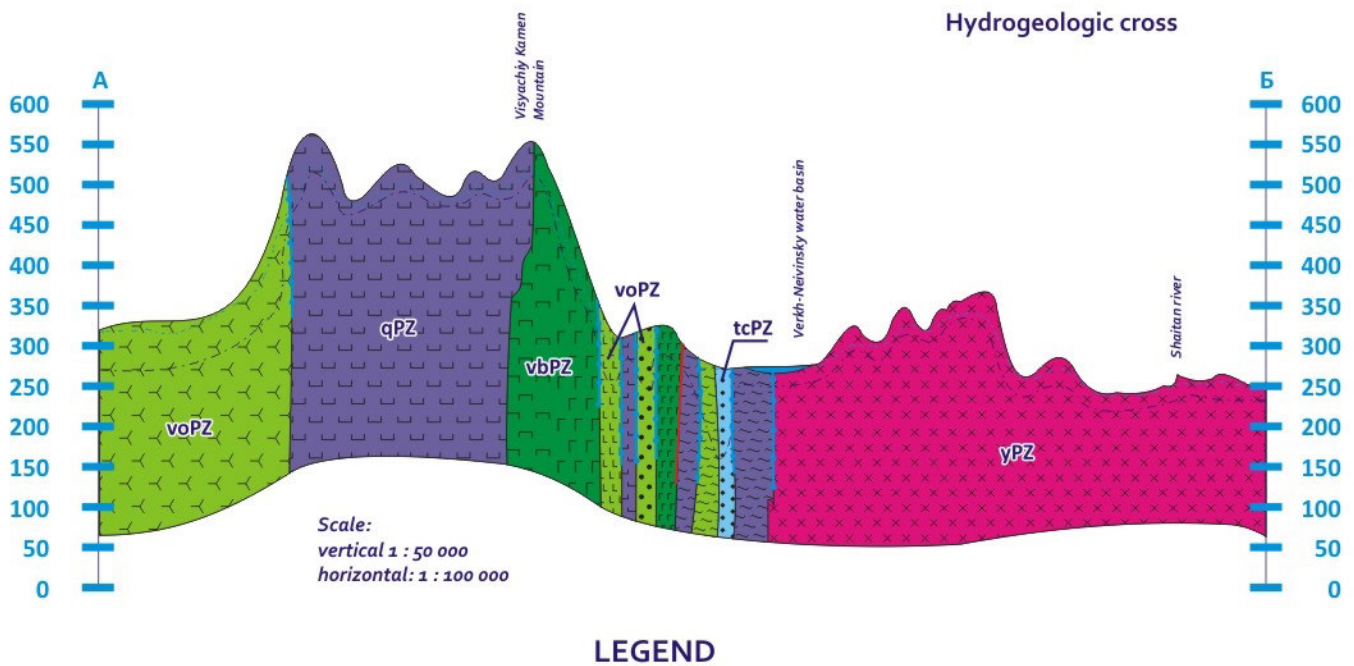
The goal of the research conducted and being conducted is to confirm that UECP JSC nuclear hazardous facilities do not affect the underground waters, and that the underground waters' impact will not cause the population and personnel radiation and toxic exposure and natural environment radioactive and chemical contamination.

Results of monitoring the area outside UECP JSC site show that uranium isotopes intervention is within acceptable limits and therefore no impact of radioactive waste storage locations on the underground waters.





## Hydrogeologic cross section in the area of UECP JSC and Novouralsk urban district location



### LEGEND

#### HYDROGEOLOGICAL AREAL CLASSIFICATION

- voPZ** Paleozoic water-bearing zone of igneous-sedimentary rock fracturing. Volcanomictous sandstone, bibbley-rock, puff-stone, basalt, tuff siltstone, tuff sandstone, carbon-bearing cherts.
- tcPZ** Paleozoic water-bearing zone of terrigenous-carbonate rock fracturing. marmorized limestone, crystalline limestone.
- yPZ** Paleozoic water-bearing zone of intrusive felsic rock fracturing. Granodiorite, tonalite, diorite.
- vbPZ** Paleozoic water-bearing zone of basic and medium intrusive rock fracturing. Gabbro-diorite, harzburgite.
- qPZ** Paleozoic water-bearing zone of ultrabasic intrusive rock fracturing. Dunite, serpentinite, pyroxenite.

#### LITHOLOGICAL COMPOSITION

- |  |                       |  |                                   |
|--|-----------------------|--|-----------------------------------|
|  | Dunite                |  | Serpentinite                      |
|  | Chert                 |  | Granodiorite                      |
|  | Basalt                |  | Puff-stone of various composition |
|  | Crystalline limestone |  | Gabbro-diorite                    |
|  | Harzburgite           |  | Bibbley-rock                      |

### The population is free from radiation exposure

In 2014 the Company experts developed the science-based reference levels. Meeting these levels definitely confirms the absence of the Company environmental impact ('zero' environmental impact). These reference levels were exceeded in none of environmental components.

**Table1. Main objects of ecological interest within UECP JSC zone of influence**

Object of ecological interest	Effect indicator	Zero Level	Actual Content
Ambient waters	Uranium content, kg/l	2.2	0.02 - 0.03
Ambient air	Total $\alpha$ -activity Bq/m <sup>3</sup>	0.33	<0.13
Vegetables – potatoes	Uranium content, kg/l	2.4	0.79
Vegetables – except of potatoes	Uranium content, kg/l	1.7	0.38 - 0.47
Grassland	Uranium content, kg/l	135	32

## 6 Environmental impact

In compliance with the environmental legislation change UECP JSC has made public registration of all operated facilities. By impact on the environment UECP JSC facilities are regarded as 2nd and 3rd category facilities.

### 6.1 Withdrawal of water from water sources

UECP JSC takes water from Verkh-Neivinsky, Neivo-Rudyansky and Ayatsky water basins in the course of production for charge of enrichment production external line cooling system and water supplied by MUP Vodokanal (Municipal unitary company) as drinking water source.

Recirculating water supply shall be performed as follows: upon equipment cooling the process water is discharged through the guide channels into Verkh-Neivinsky and Neivo-Rudyansky basins. Water in the basins is cooled and thereafter supplied again to the process facilities using pumping stations.

Table 2. Water withdrawal from natural water sources, thousand m<sup>3</sup>/a

Water source	2016	2017	2018	2019	2020
Verkh-Neivinsky water basin	2706	2415	2419	2586	4902
Neivo-Rudyansky water basin	585	542	567	542	539
Ayatsky water basin	31	11	14	22	58
Total	3322	2968	3000	3150	5499

Waste water discharge volume has increased due to increase of water consumption by UECP JSC water consumers.

#### Characteristics of water sources

##### ● Verkh-Neivinsky water basin

is used for the supply of drinking water to Novouralsk urban district population and technical water to the companies of Novouralsk urban district and Verkh-Neivinsky settlement. Withdrawal of water greatly impacts the water basin (makes over 5 % of average annual volume). The total capacity of Verkh-Neivinsky water basin makes 64 million m<sup>3</sup>.

##### ● Neivo-Rudyansky water basin

is used for the supply of technical water to the Company facilities. Generally it is used as waste water receiver for Novouralsk urban district industrial and public utilities.

##### ● Ayatsky water basin

is used as a reserve water source for adding water to Verkh-Neivinsky water basin in the low water years. It also serves as water source for gardeners' partnerships.

Table 3. Fresh water saving due to recycling and reuse of water supply

2016	2017	2018	2019	2020
155925	138609	155016	153726	165736

Consumption in recirculating water supply systems, thousand m<sup>3</sup>/a

## 6.2 Discharges into open hydrographic system

UECP JSC discharges waste waters through 3 discharge outlets. Permissible discharge limits (PDL) were specified for every discharge outlet. Permits for discharge of pollutants with waste waters were obtained. The Ministry of natural resources of Sverdlovsk region issued “Decisions on the granting of water bodies for waste water discharge”. According to «Decisions ...» UECP JSC was permitted to discharge up to 8.3 million m<sup>3</sup> of waste waters into the surface-water bodies. According to the in-process monitoring results the actual volume of discharge in 2019 made 7.1 million m<sup>3</sup>. The waste water is classified as partially clean water. Off-schedule discharge is not performed. Water receiver is Obvodnoy channel on Bunarka river. Pollutant content shall not depend on average dryness of the year.

Table 4. Wastewater composition by main pollutants in 2020

Priority pollutants	Class of hazard	ADL, t/a	Actual discharge, t/year
Petroleum products	3	*	0.3
Suspended substances	4	*	11
Ammonia nitrogen	4	*	1.4
Nitrites	2	2	0.25
Phosphates	4	*	0.23
Total, only by basic substances			13.18

\* - in compliance with Federal Law dated 21.07.2014 № 219-FZ (as amended on 26.07.2019) On revision of Federal Law On Environmental Protection and certain legislative acts of Russian Federation allowable discharge rates in regard to these pollutants for UECP JSC objects are not set.

Diagram 2. Allowable Discharge Rate



In 2018-2019 industrial water consumption has increased due to increase of water consumption by UECP JSC water consumers – companies of Novouralsk industrial site and amount of precipitations.

## 6.3 Radionuclides discharge

UECP JSC completed package of measures focused on terminating discharge of waste waters, containing radionuclides. This work resulted in termination of radionuclide discharge into surface-water bodies since 2006.

## 6.4 Chemical release

In 2020 the actual release made 26 tons, being at the same level as in 2018-2019. The maximum allowable emission for UECP JSC amounts to 26 tons. It should be noted that previously the most part of chemical release was made by UECP JSC thermal power plant (TPP).

The overall air emissions were reduced due to transfer of TPP assets to OTEK JSC branch in 2017.

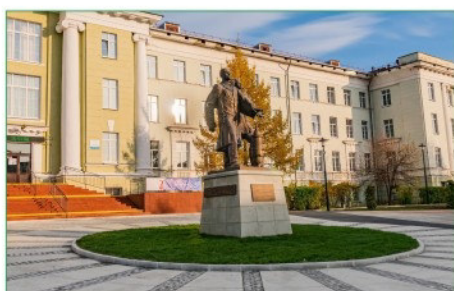
The Company chemical release monitoring is performed in accordance with annual “Chemical releases monitoring plan”, approved by UECP JSC Technical Director. Hydrogen fluoride release from all emission sources of enrichment production shall be controlled by means of instrumental methods. The volume of other emissions shall be determined using duly approved procedures based on emission calculations as per specific indicators.

Diagram 3. Air Emissions



Table 5. UECP JSC chemical pollutant emissions

pollutant		2016	2017	2018	2019	2020
	<b>Total</b>	<b>523.008</b>	<b>41.757</b>	<b>26.070</b>	<b>26.070</b>	<b>25.715</b>
	Solid	0.898	0.714	0.678	0.678	0.658
	Gas and liquid pollutants, among them	522.110	41.043	25.392	25.392	25.057
	Sulfur dioxide	3.808	0.438	0.141	0.141	0.134
	Carbonic oxide	37.078	16.453	0.157	0.157	0.151
	Nitrogen oxides (in-equivalent NO <sub>x</sub> )	432.700	1.931	0.327	0.327	0.326
	Hydrocarbons (without VOC)	0.420	0	0	0	0
	Volatile organic compounds (VOC)	40.205	14.104	10.045	10.045	9.723
	Other gas and liquid pollutants	7.899	0	14.722	14.722	14.723



## Initiatives on greenhouse gas reduction and progress made

The Company implements the “Program for energy saving and energy efficiency improvement in UECP JSC”. The Program effectiveness is confirmed by the yearly reduction in direct greenhouse gas emissions during combustion of organic fuel and indirect emissions during consumption of energy. The overall direct greenhouse gas emissions were reduced due to transfer of TPP assets to OTEK JSC branch in 2017. Indirect greenhouse gas emissions were increased due to thermal power overconsumption. The overconsumption cause is subnormal season temperatures.

**Table 6. Direct & indirect greenhouse gas emissions**

tons/year

Material (substance)	2016	2017	2018	2019	2020
Direct greenhouse gas emissions					
For all types of emissions in CO <sub>2</sub> equivalent	379953	94	145	79	74
Indirect greenhouse gas emissions					
For all types of emissions in CO <sub>2</sub> equivalent	723213	840648	876353	885221	889288

**Table 7. Greenhouse gas emission rate**

Material (substance)	2016	2017	2018	2019	2020
Total direct and indirect greenhouse gas emissions, ton	1080129	40657	876353	885300	889362
Annual products and services revenue, mln rubles	22908	23881	22310	23560	22006
Intensity of greenhouse gas emissions /annual revenues from product sales, tons/mln rubles	47	35	39	38	40

### Nuclear industry contribution to greenhouse gas emission reduction

In estimating greenhouse gas emissions by the nuclear industry companies it should be mentioned that atomic energy is classified as low carbon energy source. According to the forecast of International Energy Agency the share of low carbon sources in the global energy mix will make 40 % by 2040. Along with renewable generation resources, atomic energy will become the integral part of low carbon energy mix.

Operation of all Russian-designed NPPs in the world prevents from emitting about 213 mln tons of CO<sub>2</sub>-equivalent annually, and particularly in Russia– 108 mln tons of CO<sub>2</sub>- equivalent (about 7 % of all greenhouse gas emissions in the country).

UECP JSC covers ~ 20% of the global demand for uranium enrichment. UECP JSC is involved in generation of every fifth nuclear power kilowatt under the sun, and thus the Company activity saves the earth atmosphere from releasing ~470 million tons of greenhouse gas.



## 6.6 Radionuclides release

The results of radionuclide emission monitoring are given in Table 8. According to the Table, UECP JSC radionuclides release meets the specified limits. Thus, the population dose rate from radionuclide inhalation does not exceed 0.005 mZv/year, which makes 0.5% of population dose limit.

**Table 8. Results of radionuclides release monitoring**

Nuclide	2016	2017	2018	2019	2020
Total atmospheric release of long-lived alpha-active radionuclides, Gbq/year	0.093	0.087	0.079	0.073	0.065
Allowable release level, Gbq/year	0.3	0.3	0.3	0.3	0.3

## 6.7 Production and consumption waste management

UECP JSC do not perform production and consumption waste processing. Wastes generated as a result of UECP JSC economic activity are delivered for processing to the authorized companies in compliance with the concluded contracts.

Of 5 095 tons of production and consumption waste, generated in 2020, 3 851 (76%) tons made ferrous and non-ferrous scrap waste produced in the course of equipment replacement and upgrade.

The metal scrap waste is delivered for processing and returned to production facilities in the form of finished products. In 2019 the processed production and consumption waste volume made 82% of the total waste volume, in 2018 - 95 %, in 2017 - 86 %, in 2016 - 81 %.

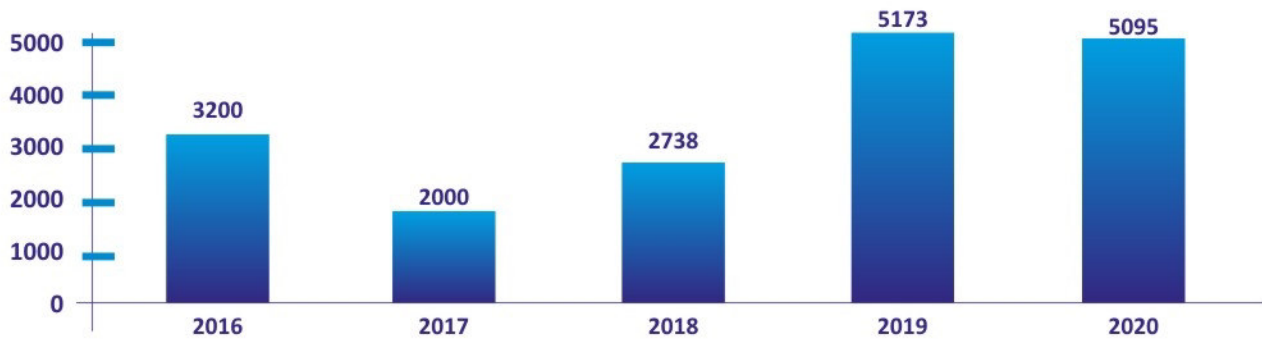
The other types of waste resulted from UECP JSC operations include:

- Solid municipal waste that shall be delivered to the Regional operator according to the legislation.
- Production and consumption waste including rags, tree scrap material, waste lamps, oiled waste, sorbents that are delivered for further processing or disposal to special facilities.

**Table 9. Dynamics of production and consumption waste generation, t/year**

Pollutant	2016	2017	2018	2019	2020
Total waste generation Including:	3200	2000	2738	5173	5095
1st class	30	3	2	4	5
2d class	0	0	0	0	0
3d class	73	<1	3	<1	18
4th class	453	223	129	817	1144
5th class	2644	1773	2604	4351	3928
Processed waste	2600	1720	2585	4260	3851
Delivered for disposal	600	280	153	96	147
Solid municipal wastes transferred to regional operator	0	0	0	817	1097

Diagram 5. Generation of production and consumption waste, tons per year



## 6.8 Radioactive waste management

Generation of solid radioactive waste (SRW) at different stages of production process is resulted from UECP JSC nuclear facility operation.

SRW are classified into two types:

- low-level radioactive waste (amounts to <10% of overall volume of generated SRW),
- very low-level radioactive waste.

The most part of SRW volume collected at the Company facilities is subject to processing for further compacting. After processing SRW packages shall be delivered to FSUE "NO RAO" SRW storage facility, which is safe and isolated from the environment.

Decontaminating uranium-bearing solutions shall be processed by means of special technology. Upgrade of uranium-bearing solution processing technology in 2006 ensured reduction of the content and activity of radioactive substances in such solutions to the background levels. It makes possible to tell responsibly of zero radioactive substances' discharge with wastewater.

Radiation safety assurance of personnel, population and environment on the basis of radiation safety regulations and radiation protection requirements are UECP JSC core principles and criteria while handling SRW.

The most part of solid radioactive waste (SRW) produced in UECP JSC is made up of waste generated in the course of thermal breakdown of gas centrifuge units.

UECP JSC performs continuous upgrade of production and thus the SRW volume is rather unsteady not only due to thermal breakdown of gas centrifuge units but also due to dismantling buildings, constructions and production facilities, which results in construction waste generation.

UECP JSC became the first company in Russia possessing the full range of facilities and technologies making possible the complete SRW management cycle – from generation to SRW preparation for final disposal. UECP JSC effectively operates SRW compacting and conditioning installation: waste breaking, burning, compaction, cementation, containerization. The current technologies made it possible to reduce volume of generated SRW by factor of 25-30 and bring it into safe condition.

Diagram 6. SRW generation

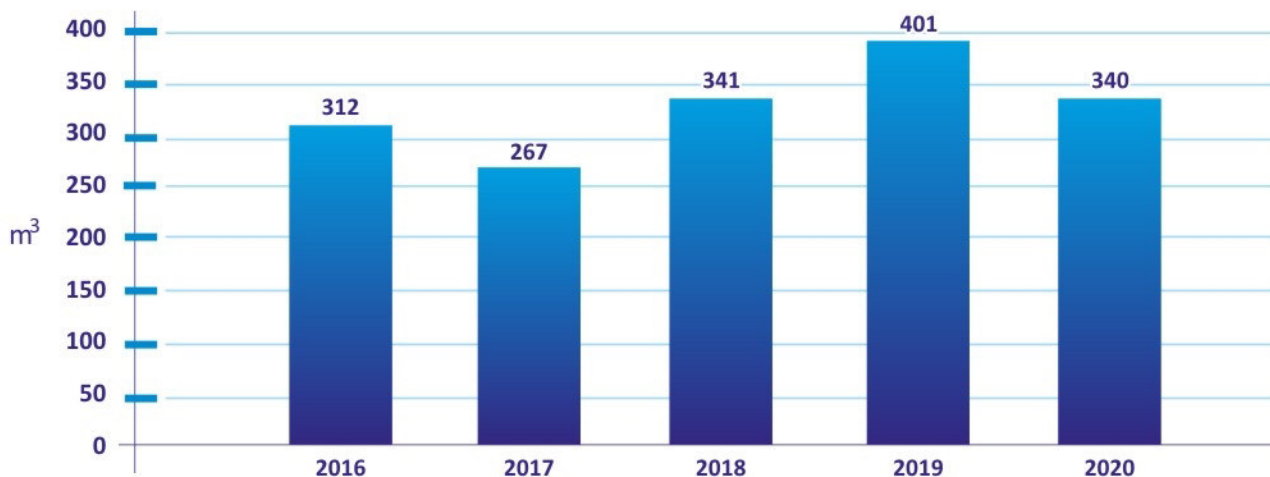
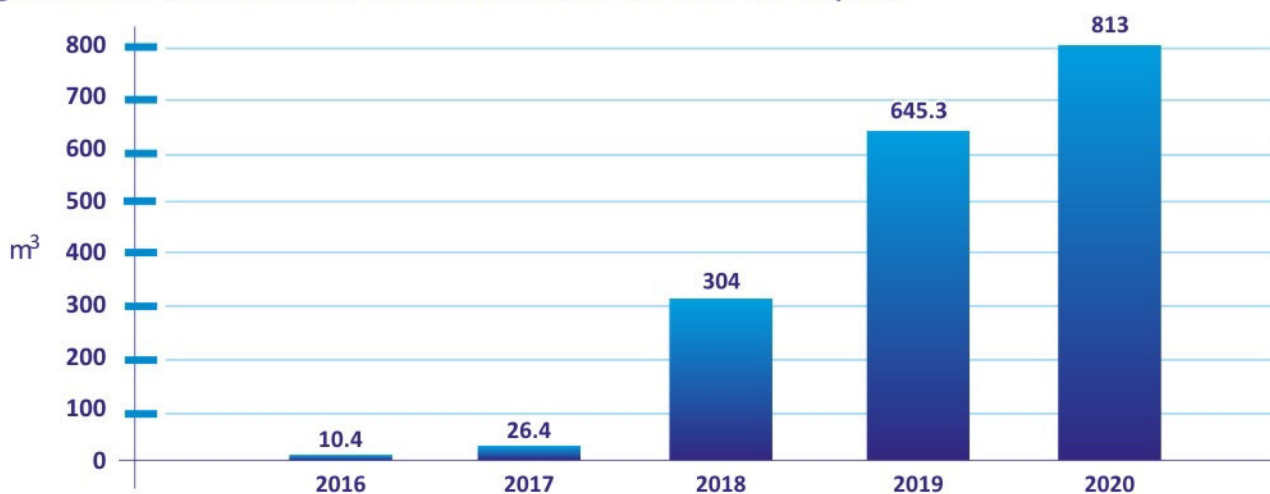


Diagram 7. The volume of SRW delivered to FSUE "NO RAO" for disposal



Based on the results of research and development UECP JSC developed a series of technical solutions concerning change of SRW processing flow-charts. Therefore using new technologies UECP JSC:

- ceased generation of liquid radioactive waste
- ensured zero level of radionuclide discharge in surface water bodies
- designed, built and accepted for operation the isolated SRW storage facility that was transferred for use to FSUE "NO RAO".
- developed new procedures for radioactive waste analytical control brought a batch of UECP JSC SRW waste into compliance with safety criteria for final disposal in 2016
- ceased generation of radioactive waste of the third class of hazard in 2016 was the first in the RF to dispose of the batch of low-level solid waste.

SRW safe management infrastructure was established in Rosatom State Corporation Fuel Division

The diagrams 6 and 7 show that the volume of solid radioactive waste delivered to national operator exceeds the volume of UECP JSC generated waste since 2019. Therefore already accumulated SRW stored at UECP JSC site is delivered for safe storage.



## 6.9 Energy use

UECP JSC is committed to introduction of energy-saving technologies and cost reduction. Based on the results of the research conducted in 2010 the Program for energy saving and energy efficiency improvement at UECP JSC was developed, approved and started in 2011. The Program is focused on the effective use of energy resources and reduction of energy losses resulted from changes in personnel behavior, and improvement of production process.

### Effective use of energy resources & energy loss reduction

- UECP JSC introduced and ensured successful operation of energy management system as per ISO 50001. UECP JSC Energy policy was developed and introduced.
- A set of projects on the Company manufacturing infrastructure improvement is carried out. The installed equipment is more highly-effective and permits the use available capacities in more flexible way.
- In terms of enrichment production equipment technical upgrade gas centrifuges of the 5th generation were replaced by gas centrifuges of the 9th/9th+ generation with low energy consumption.
- Installation of AKSU-3 process control and emergency protection systems was performed in process shop 53 using support equipment.
- Heating systems of several facilities were switched over from steam to hot water in order to ensure energy efficiency improvement.
- An automated energy accounting system and data collection center including over 600 energy metering units (water, wastewaters and thermal energy) and 500 electricity metering units were commissioned.
- Works on partial replacement of UECP JSC heat and water supply networks were carried out.

Table 10. Energy consumption

	2016	2017	2018	2019	2020
UECP JSC power consumption, thousand kW/ h	976161	979059	1012306	1023411	1027874
UECP JSC thermal energy consumption, Gcal	604521	587907	627539	631946	626314
Total energy consumption, GJ	6045161	5985584	6279965	6330000	6322600



## 6.10

## Share of UECP JSC emissions, discharge & waste in Sverdlovsk region

UECP JSC share in total volume of chemical pollutants (ChP), radionuclide emissions and discharge both in Sverdlovsk region and within the territory of Rosatom State Corporation enterprises makes less than 1 percent.

**Table 11. Comparison of indicators with total volume within the territory**

Indicator	Total volume within the territory	UECP JSC total volume	UECP JSC Share	
ChP emissions, thousand tons	793*	0.026	<0.01%	* - Total volume in Sverdlovsk region in 2019.
Discharge (volume of discharged waters), million cubic meters	704*	5.3	<1%	** - Total volume in JSC TVEL companies in 2019 r. The given values of radionuclide emissions and discharge do not exceed the RF permissible limits.
Production and consumption waste, million tons	139*	0.005	<0.01%	
α- emitting nuclides atmospheric emissions, GBq	6.4**	0.067	~1%	
α- emitting nuclides discharge into open hydrographic network, Bq	It is not estimated because of UECP JSC impact absence			

## 6.11

## Share of sold products and its packing materials returned to producer for processing

UECP JSC production process allows for 100% return of packaging materials (vessels) to product manufacturer. Safety of purchased products and services is ensured by:

- incoming inspection and acceptance control
- specifying requirements for the suppliers.

When evaluating and choosing suppliers the following factors are taken into consideration:

- technical requirements for the supplied products and availability of regulatory documents specifying these requirements
- availability of documents proving conformity of product to ecological and environmental safety requirements (certificates of goods conformity and origin, safety and health certificates)
- availability of documentation confirming the product quality.

Contractor obligations on operations (activities) management in delivering products and services are specified in the contracts.

To improve the integrated management system the Company implements "Environmental protection and ecological safety requirements during work performance, product and service delivery by the contractors".

## Financial aspects and other risks and opportunities for the Company in the context of climate change

Meteorological observations performed since 1960 show that temperature and wind regimes, amount of precipitations are practically constant within UECP JSC activity area, and their annual average is practically constant. Climatic and weather conditions are rather stable.

To minimize the weather damage risks the Company annually develops plans of activities focused on emergency situations' prevention (flood protection, fire protection). Taking into account the Company geographic location, existing statistical observations and developed activities addressed to mitigating any possible climatic accidents, these risks are extremely low.

In view of the slow rate of climatic changes, the Company management has not performed special quantitative evaluation of financial consequences in the context of climate changes in medium and long-term perspective.

## Implementation of environmental policy

Environmental safety is of high priority for nuclear industry and is mandatory condition for the development of nuclear technology and nuclear facility operations. Moreover, despite of nuclear industry sustainable development, improvement of technology and safety, stabilization of nuclear industry is closely related to its ecological and social acceptability. At present it greatly depends on conditions ensuring reduction of radioactive waste volume, safe waste disposal, development of decommissioning technologies and solution of nuclear legacy problems.

UECP JSC scope of activity is of great strategic importance for the development of Novouralsk urban district, since it greatly contributes to its steady innovation progress. In this connection UECP JSC management understands the need for ensuring balance between strategic objectives for corporate business development and environmental safety, being the basis for life and health of present and future generations. One of the Company key tasks remaining vital for many years is to ensure the parity between the economic and environmental values. Practically it is ensured by technical upgrade, modernization and energy saving corporate programs, as well as detailed assessment and minimization of potential environmental risks during implementation of new build projects. Improvement of environmental and energy performance is the mainstream of the Company strategy, a key element of environmental management system and environmental policy. UECP JSC advanced multilevel environmental management system is underpinned by qualified scientists and engineers and meets the modern criteria for management efficiency in this field. The complex approach to solution of problems addressed to conservancy and environmental protection enables UECP JSC to achieve all intended environmental purposes, minimize environmental risks and increase social responsibility of business.

## Initiatives on mitigating products & services environmental impact and the scope of mitigation measures

Operational safety of UECP JSC nuclear facility (NF) and its systems and components is ensured by steady implementation of defense-in-depth principle. Safety is ensured by application of physical protection system acting as a barrier on the way of ionization radiation, nuclear material and radioactive substance into the environment, should it be the package (vessel, pipeline) or structure, frame or roof of any building. UECP JSC NF safety includes protection of physical barriers, ensuring their operation within specified lifetime, and personnel and environment protection. For this purpose UECP JSC performs a complex of special measures to prevent emergencies which may result in process equipment seal failure (abnormality of process conditions, violation of equipment normal operation conditions and limits, self-sustained chain reaction, fire, dropping of goods, mechanical or corrosion damage, etc.), and consequence limiting control measures.

**Table 12. Current environmental costs in 2020, thousand rubles.**

Type of environmental activity	Annual current (operating) costs	Payment for services intended for nature protection purposes
<b>Total</b>	<b>738 889</b>	<b>66 315</b>
including:		
air protection	126 399	310
collection and purification of waste water	229 926	44 430
waste management	2 657	2 863
environmental radiation safety	308 311	9 160
scientific research and studies of decreasing the negative man-made environmental impact	-	9 423
other environmental activities	1 596	129

Safety level achieved by UECP JSC in NF operation and other activities in nuclear field is ensured primarily by technical measures and decisions taken in designing equipment, systems, NF components, and also by development of technological processes relating to nuclear material, radioactive substance and radioactive waste management.

Implementation of measures on reducing environmental impact is one of the mainstems of the Company environmental activity. UECP JSC environmental costs are basically related to processing and purification of discharge and emissions and addressed to supporting technical and

organizational activities. Environmental protection investment is generally made in upgrading equipment and waste handling facilities.

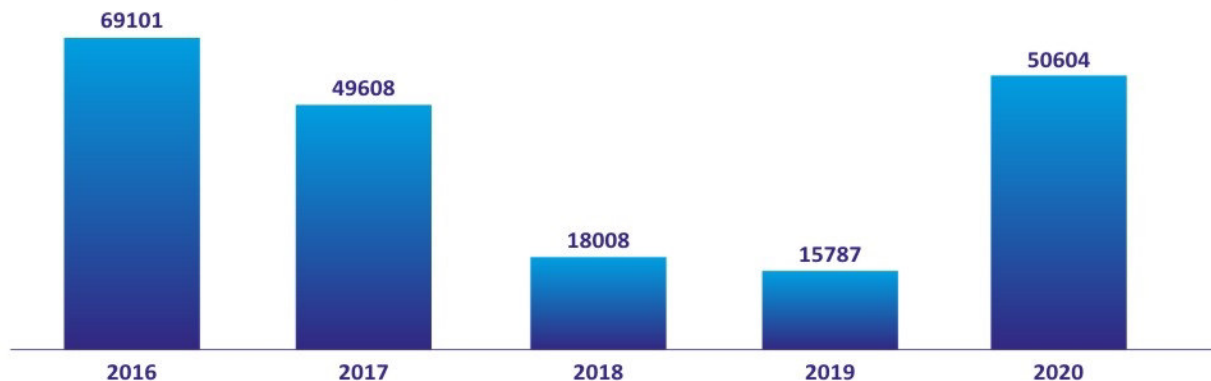
**Diagram 8. Current (operating) environmental costs, mln rubles**



**In 2020 the cost increase occurred due to:**

- SRW delivery to FSUE "NO RAO" SRW near-surface storage facility
- Increase in payment of services for industrial environmental monitoring of environmental medium (including radiation monitoring)
- Execution of contract with regional operator on solid municipal waste management.

**Diagram 9. Environmental investment data, thousand rubles**



**In 2020 environmental costs by means of capital investment made**

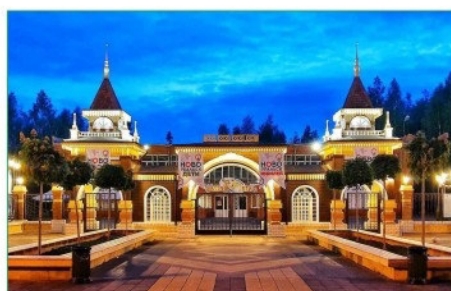
**50 604 000**  
rubles  
and included:

- Development of the ground water monitoring system at UECP JSC VI-VII industrial sites
- Activities on developing the facility for RAO conditioning and intermediate storage.

**Table 13. Environmental pollution payments, thousand rubles**

	2016	2017	2018	2019	2020
Pollution charge	96	247	169	152	111
water bodies	43	95	100	101	49
open air	53	2	42	2	2
waste disposal	0	150*	27	49	60

\* The calculation was made in accordance with new requirements of the Russian Federation legislation in the field of environmental protection and production and consumption waste management.

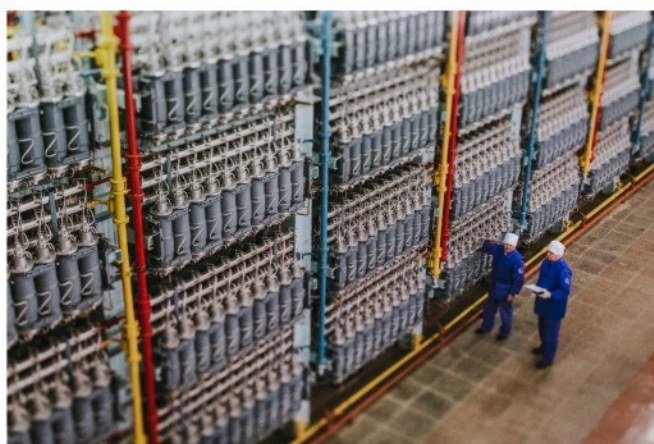


## 8 Environmental education

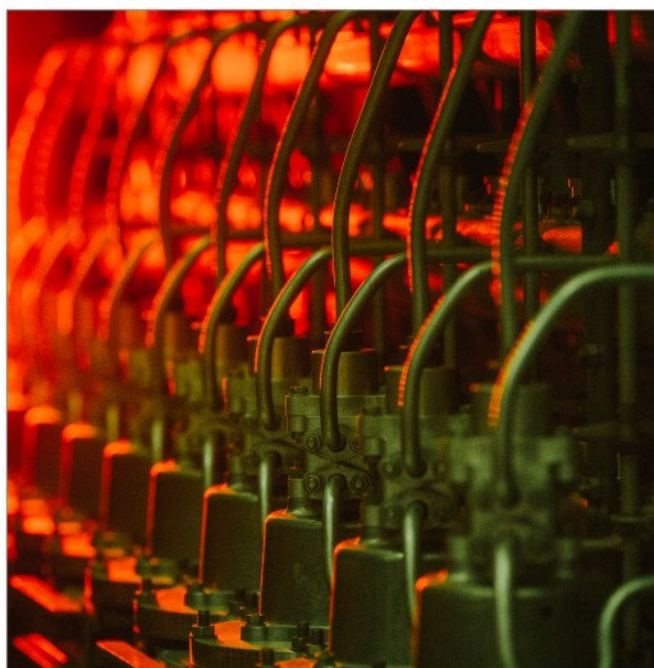
### 8.1 Cooperation with public and local authorities

The proper level of nuclear, radiation, industrial, environmental and labor safety at UECP JSC was confirmed by many inspections conducted by the following executive authorities:

- Urals Directorate of the Rostekhnadzor– as related to compliance with industrial safety requirements at UECP JSC hazardous facilities
- Urals Interterritorial Directorate for supervision of nuclear and radiation safety - as related to nuclear facility operation compliance with standards and regulations
- RF FMBA Regional office No 31 – as related to UECP JSC compliance with health legislation requirements.



UECP JSC management cooperates closely with Novouralsk urban district administration. UECP JSC employees jointly with Novouralsk urban district public authorities constantly perform activities in the field of landscaping, garbage collection, and various charitable activities.



## 8.2 Promoting public awareness

UECP JSC pays great attention to environmental education. One of the Company key principles stated in environmental policy is to ensure transparency and public availability of information related to UECP environmental protection and safety activities. Dozens of information materials are published annually in corporative, local, regional and branch mass media. The published information highlights the Company environmental activities and environmental conditions in the territory of presence. In accordance with “transparency” policy pursued by UECP JSC, the Company annually organizes the ecological press-tours to the site for Novouralsk and Sverdlovsk region students, newsmen, bloggers and representatives of public organizations. The tour participants receive unique opportunity to visit the Company process facilities, measure radiation background in any point of their route and make sure that the plant is environmentally friendly. Since 2008 the Company annually publishes Environmental safety report presenting



full and objective information on UECP JSC current environment conditions and environmental impact. Since 2012 Environmental Safety Reports have been publically presented to concerned regional public communities and Novouralsk citizens. The Report is delivered to organizations cooperating with UECP JSC on environmental protection and industrial safety, mass media and public organizations located in Novouralsk urban district, and is available on UECP JSC web-site ([www.ueip.ru](http://www.ueip.ru)). Furthermore, the news-bulletin on radiation situation in the territory of Novouralsk urban district is posted monthly on UECP JSC web-site.

UECP JSC management and specialists of environmental protection department are always ready to answer all questions related to the Company environmental activity and production ecological safety.

## Cooperation with ecological public organizations, scientific and social institutions, population

In 2020 more than 30 informational materials that covered the Company environmental activity and state of environment at business site were published in corporative, city, regional and branch mass media.

Unfortunately in connection with COVID-19 pandemic almost all public events, including environmental actions, have been cancelled or rescheduled.



**In 2020 the following events were held:**

- in January UECP JSC employees took part in the meeting of Public organization of veterans with a focus on depleted uranium hexafluoride safe handling in UECP JSC
- in February UECP-site tour for participants of interterritorial championship "Young professionals of Rosatom Fuel Company – AtomSkills Juniors" was conducted
- in March meeting with pupils of lyceum №56 was held. The meeting was devoted to nuclear power safety and UECP JSC production environmental safety
- Special section "Environmental situation" is active at UECP social network pages.





## 8.4 Plans for the future

According to the current version of Environmental policy the main future tasks in the field of environmental protection and ecological safety are:

- meeting the requirements of international, federal and regional legislation, rules and guidelines in the area of radiation and nuclear safety, environmental protection, sanitary-and-epidemiological well-being of population, protecting population in natural and man-made emergency situations, and other commitments undertaken by UECP JSC
- developing the natural environment and radiation control and monitoring systems using advanced automatic equipment and software
- improving the resource and energy efficiency of production
- ensuring decommissioning of UECP JSC nuclear facilities being out-of-service
- reducing the volume of radioactive and hazardous industrial waste
- regularly informing UECP JSC personnel, citizens and other concerned parties of environmental and radiation situation and UECP JSC environmental impact
- constant improving the integrated management system as required by ISO 9001, ISO 14001, OHSAS 18001, ISO 50001, IAEA GSR Part 2, IAEA GS-G-3.1.





List of art school students  
whose pictures are presented  
in the report:

Cover:

**Arina Trushina**

First broadside (top-down):

**Varya Brushinina**

**Nikita Belov**

**Darya Sabanina**

**Milena Ganicheva**

**Irina Sergienko**

Page 8:

**Mikhail Serebryakov**

Page 9 (left-right):

**Alena Polyanskaya**

**Masha Katkova**

Page 24 (left-right):

**Sofya Krasheninnikova**

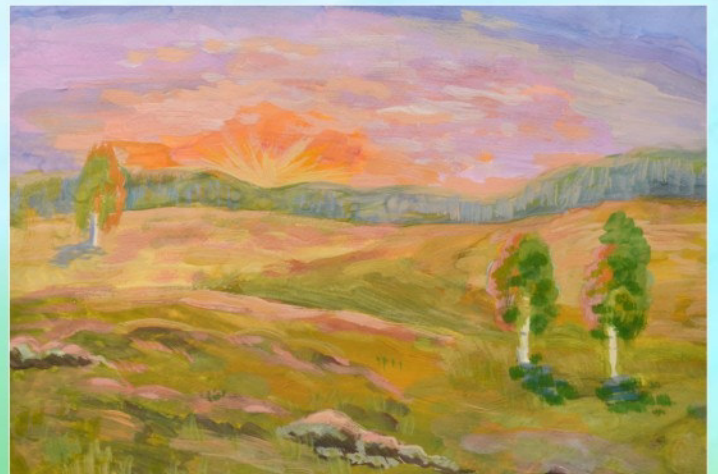
**Diana Shchekaleva**

Last broadside (top-down):

**Irina Lebedeva**

**Yana Kolesnik**

**Nastya Tikhonova**



Photos of the city,  
UECP JSC industrial sites  
and activities:

UECP JSC media office

open sources



UECP  
ROSATOM

## Urals Electrochemical Plant

Joint Stock Company

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## ENVIRONMENTAL SAFETY REPORT

2020