



**URAL  
ELECTROCHEMICAL  
INTEGRATED PLANT**

ASC «ROSATOM» COMPANY

# 2015 ENVIRONMENTAL SAFETY REPORT





Отчёт по экологической  
безопасности  
Акционерного общества  
«Уральский  
электрохимический  
комбинат»  
за 2015 год

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## Introduction

Annually since 2008, the Company publishes Environmental Safety Reports presenting information on the current state of natural environment and SC UEIP environmental impact. One of the Company key tasks remaining consistent for many years is to ensure the parity of economic and environmental values. Practically it is ensured by implementation of technical upgrade, retrofit and energy saving corporate programs, and by detailed assessment and minimization of possible environmental risks as part of greenfield projects. SC UEIP operation is of great strategic importance for the development of Novouralsk Urban District, as it greatly contributes to its innovation progress. Therefore, SC UEIP management understands the necessity to provide a balance between strategic objectives of corporate business development and environmental safety, regarded as the basis for life and health of present and future generations.

In 2015 SC UEIP Environmental Protection Department organized and held the «Beauty of Urals» photo contest. The purpose of the contest was to promote the idea of natural environment conservancy, including

animal and vegetal life, by means of popularizing photography as «nondestructive» form of contact with nature. The main topic of photos is a girl/lady against the Ural nature. The contest name and topic were devoted to the concept of man and nature unity, characterizing the female principle of nature. Announcement of results of contest and awarding ceremony took place on March 3, 2016. The winners in the following nominations were chosen:

- the audience choice award won the photo by Olga Kolosova
- the most perspective photo was announced the photo by Marina Makurina
- the most creative photo was presented by Maria Kamalova
- the total winner was the photo by Tatyana Schekaleva, displayed on the cover page of this report.

The winners of the photo contest were awarded the memorable gifts and free photo session. The most attractive photos were displayed in this report.

# 1. SC UEIP General Presentation & Core Business

In 1945 the Soviet of People's Commissars of the USSR took the decision to start the construction of Gas Diffusion Plant in Sverdlovsk-44 of Sverdlovsk region. The Plant was designed for production of highly enriched uranium (HEU) under the Soviet nuclear weapons program.

In 1949 Ural Electrochemical Plant was put in operation. It was the first USSR Plant engaged in commercial uranium isotope separation using gas diffusion technology. In 1954 the production of low enriched uranium (LEU) was launched, which was to meet the needs of nuclear power industry (reactors, offshore power plants, research reactors and nuclear power plant reactors).

In 1962 the first in the world centrifuge uranium enrichment plant was commissioned, which was an important step towards increasing efficiency of UEIP separation production. UEIP experts and qualified specialists contributed greatly to this process and always kept the separation production at the highest possible level.

In 1966 the plant reconstruction program started and by 1988 the gas diffusion equipment has been completely replaced by the centrifuges. It made possible to reduce the power consumption of separation production by a factor of 10 at twofold or threefold increase in enrichment capacity.

In the early seventies UEIP entered the international market and since then, it has exported low enriched uranium to a number of companies of France, Germany, Belgium, England, the USA, South Korea, Sweden, Spain, Finland, Switzerland, Italy, Argentina. In 1989 UEIP discontinued fabrication of weapon-grade uranium.

Pursuant to later intergovernmental agreements on reduction of nuclear weapons in 1995 UEIP initiated reprocessing HEU into fuel for nuclear power plants. For this purpose the special HEU-LEU technology was developed and introduced.

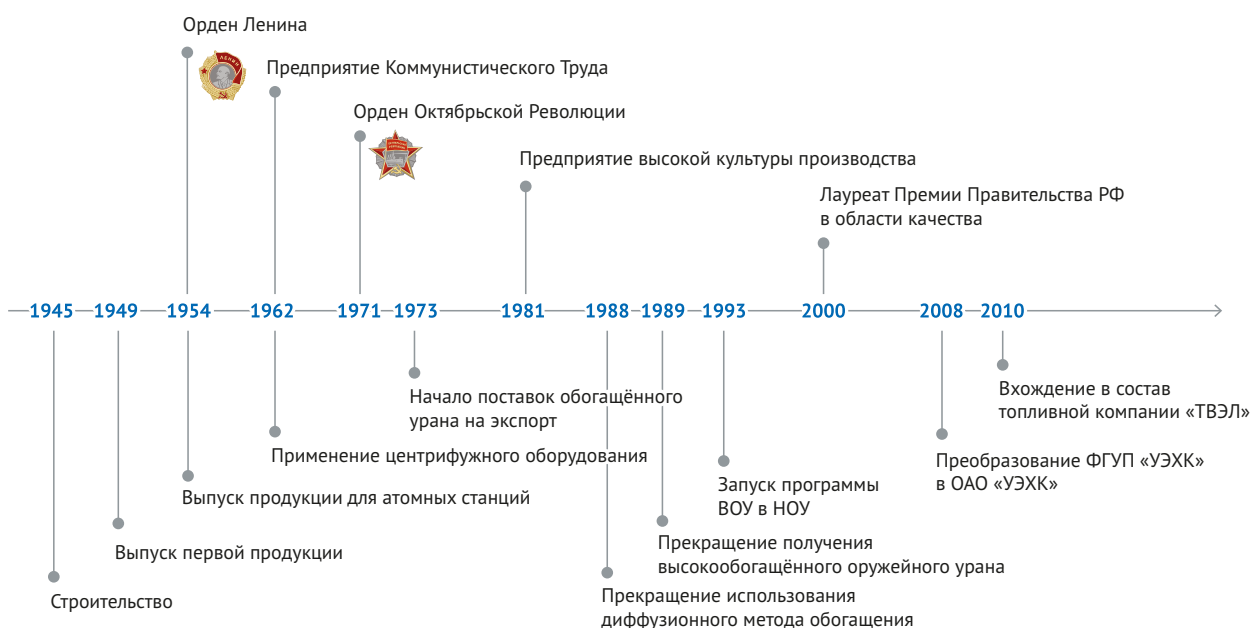
On August 15, 2008 Federal State-owned Unitary Enterprise Ural Electrochemical Integrated Plant was reorganized into Joint-Stock Company Ural Electrochemical Integrated Plant.

An important milestone became UEIP 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 capital.

According to the Russian Federation legislation from the beginning of 2015 the full commercial name of the Company is Stock Company Ural Electrochemical Integrated Plant (SC UEIP).

SC UEIP is located in the industrial area of Novouralsk city in Sverdlovsk region 80 km to the north-west of Yekaterinburg. Two localities directly border on the Company: that is Novouralsk city (the population is about 88 000 people) and Verkh-Neivinsky settlement (the population is about 6 500 people).

SC UEIP is one of the major links in a chain of the Russian nuclear fuel cycle, holding intermediate process position between uranium production and fuel fabrication for nuclear reactors.

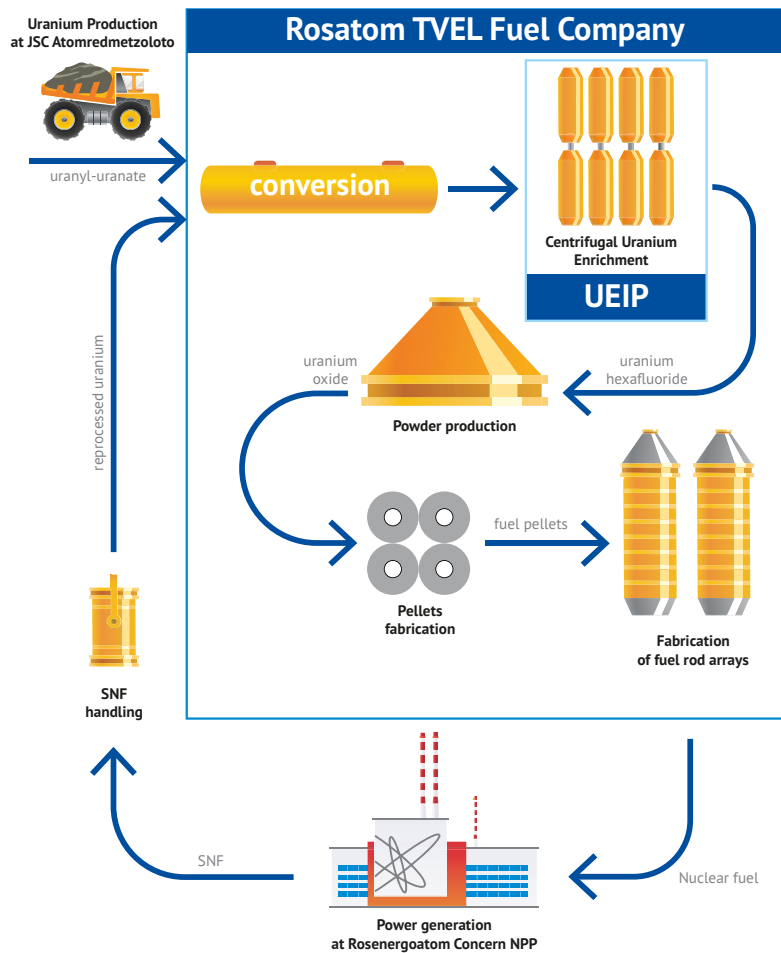


Nowadays SC UEIP is the largest uranium enrichment enterprise not only in Russia, but also all over the world. The Company enrichment production uses highly effective and reliable gas centrifuge technology. The following companies represent enrichment production of Russia and apply the same technology:

- Joint-Stock Company Electrochemical Plant (ECP), Zelenogorsk, Krasnoyarsk region;
  - Joint-Stock Company Siberian Chemical Enterprise (SChE), Seversk, Tomsk region;
  - Joint-Stock Company Angarsk Electrolysis Chemical Combine (AECC) Angarsk, Irkutsk region.
- Natural uranium consists of three radioactive isotopes:

- U-238 (circa 99.28%),
- U-235 (circa 0.71%),
- U-234 (circa 0.01%)

Many nuclear power reactors run on uranium fuel enriched in U-235. The influence of the Russian enriched uranium export on the world power balance is comparable to that of the Russian gas and oil export.



SC UEIP Position in Rosatom Nuclear Fuel Cycle



Uranium Isotope Separation Flow

In order to ensure enrichment process the natural uranium is converted to uranium hexafluoride.

- The enrichment process generates enriched uranium product (EUP) and depleted uranium hexafluoride (DU)
- EUP it delivered to the customer, and DU is transferred for storage and subsequent reprocessing

## 2. Integrated Management System



*Environmental management* is a part of the overall corporate governance system that involves well-defined organizational structure and aims at achievement of environmental policy objectives by means of environmental protection program implementation.

Its concept is based upon sustainable development model. In 1992 in Rio de Janeiro the summit of state heads was held. It was devoted to sustainable development of human society and the nature, and adopted Agenda 21, that included general provisions of the new concept being suggested to all countries of the world. The summit concluded that environmental management shall be regarded as key dominant of sustainable development and as high 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 new environmental international standards. The International Organization on Standardization (ISO) issued ISO 14000 standards stipulating the principles of environmental management systems.

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 product from development to implementation, and ensures the faultless operation of all process chains. SC UEIP QMS is being constantly improved: from zero-defect production, comprehensive quality control system to implementation, certification and utilization of QMS in accordance to ISO 9001 since 2004.

The technology for enriched uranium transfer into the transport cylinders of international customers was developed in 1973. Since then, the company product is supplied to the customers in France, Spain, Great Britain, Germany, Sweden, Finland, Netherlands, USA, Republic of South Africa, South Korea, Japan and China.

No claims on the supplied product quality were received within the whole period of export activities.

SC UEIP implemented and successfully introduced Environmental Management System (EMS). A comprehensive certification audit was conducted at UEIP in 2010. It confirmed SC UEIP compliance with the requirements of ISO 9001 and ISO 14001. The result of audit at UEIP





subdivisions was the issuance of Certificate of conformity which proved compliance of SC UEIP production organization with the requirements of QMS and EMS international standards. In 2011-2012 the Company was audited for conformity to the requirements of ISO 9001 and ISO 14001. The audit results confirmed compliance of SC UEIP QMS with the issued TUV CERT certificate. In July 2012 SC UEIP Environmental Management System was successfully audited by «Vattenfall Nuclear Fuel AB», Sweden.

A comprehensive certification audit was conducted at SC UEIP in July 2013. The audit confirmed the compliance of QMS operation to the issued Certificate of conformity. In October 2013 SC UEIP was audited as part of JSC TVEL Integrated Management System under the requirements of three international standards: ISO 9001 (Quality Management System), ISO 14001 (Environmental Management System) and OHSAS 18001 (Health Protection & Labor Safety Management System). In 2013 SC UEIP Environmental Management System was also successfully audited by the Swedish company «Vattenfall Nuclear Fuel AB». The audit results made the Swedish

customers sure that SC UEIP is a reliable and safe business-partner.

In 2014 the traditional audit of JSC TVEL Integrated Management System was successfully conducted. Besides, in 2014 SC UEIP was given a Certificate of QMS conformity to ISO 50001 standard requirements (Energy Management System). Therefore, at present SC UEIP Integrated Management System comprises:

- Environmental Management System focused on improvement of procedures providing environmental safety.
- Quality Management System focused on improvement of procedures providing high quality of output product.
- Health Protection & Labor Safety Management System focused on the Company employees.
- Energy Management System focused on improvement of procedures providing energy and natural resources saving.

Integrated Management System was implemented and introduced in all SC UEIP subdivisions providing quality and operational safety at all stages of production.

### 3. SC UEIP Environmental Policy



Systematic reduction of environmental and population impact is the highest priority of SC UEIP environmental policy. When planning its activities, the Company takes into consideration the relationship between environment and process facilities. SC UEIP employees understand their responsibility for ecological implications of production process and constantly strive for decrease of anthropogenic impact on the environment.

Pursuant to ROSATOM State Corporation environmental policy SC UEIP management is committed to the following principles:

- Meet regulations, standards and guidelines in the area of radiation and nuclear safety, environment protection, sanitary-and-epidemiological well-being of the population, protection of the population in case of environmental emergency of natural or man-caused origin.
- Decrease and prevent the Company environmental and population impact by prioritizing environmental aspects and their further management.
- Maintain high level of environmental safety based on applying environmental protection advanced technologies, equipment and methods.
- Ensure the management and personnel readiness to prevent and mitigate emergency situations and other incidents.
- Assure publicity and availability of information of SC UEIP operations regarding environmental protection and ecological safety.

To meet the objectives and implement the main

principles of environmental policy SC UEIP undertakes the following obligations:

- Carry out effective environmental monitoring and industrial ecological control in order to meet legal and other requirements in the sphere of ecological safety and environment protection.
- Ensure constant readiness to accident, incident, emergency prevention and effective management.
- Improve the personnel skills and knowledge in the sphere of environmental protection and ecological safety.
- Dialog to all concerned parties on the issues of SC UEIP operation.

The first SC UEIP Environmental Policy was introduced on April 22, 2008 by SC UEIP General Director order. The Company Environmental Policy was annually revised and updated.

The current revision of SC UEIP Environmental Policy was introduced on January 1, 2014 by SC UEIP General Director order and was approved by ROSATOM State Corporation and SC TVEL. The Company Environmental Policy was published in mass media and is available at SC UEIP official web-site: [www.ueip.ru](http://www.ueip.ru).

## 4. Basic Documents Regulating SC UEIP Environmental Activity



- Constitution of the Russian Federation
  - Federal Law No 7-FZ of 10.01.2002 on Environmental Protection
  - Federal Law No 174-FZ of 23.11.1995 on Ecological Assessment
  - Federal Law No 96-FZ of 4.05.1999 on Ambient Air Protection
  - Water Code of the Russian Federation No 74-FZ of 3.06.2006
  - Federal Law No 89-FZ of 24.06.1998 on Production and Consumption Waste
  - Federal Law No 52-FZ of 30.03.1999 on Sanitary and Epidemiological Well-being of Population
  - Federal Law No 3-FZ of 09.01.1996 on Radiation Safety of Population
  - Federal Law No 170-FZ of 21.11.1995 on Nuclear Energy Use
  - Federal Law No190-Z of 11.07.2011 on Radioactive Waste Management and Amendments to Certain Legislative Acts of the Russian Federation
  - Federal Law No. 2395-1 of 21.02.1992 on Underground Resources
  - Sanitary Rules SP 2.6.1.2523-09 of 07.07.2009 on Radiation Safety Standards NRB-99/2009.
  - Sanitary Rules SP 2.6.1.2612-10 of 26.04.2010 on 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, state 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 Basic Licensing Documents Relating to Environmental Protection**

SC UEIP obtained all necessary permits in accordance with the effective environmental legislation of the Russian Federation, including:

- Permits for emissions and discharges of polluting chemical substances and radionuclides
  - License for production and consumption waste management
  - Limit for production and consumption waste disposal
  - Certificates for hazardous production and consumption waste
  - Water use agreements
  - Decisions on water bodies» granting for use
  - Licenses for use of nuclear energy
  - Other documents.
- Contractors providing services and carrying out works at the Company site also have a complete set of necessary permits and licenses.

## 5. Industrial Environmental Control & Ambient Monitoring

The following monitoring objects within SC UEIP zone of influence are constantly monitored:

- Water bodies of an open hydrographic network, including bottom silt adjournment and the higher aquatic vegetation
- Ambient air

- Soil and vegetation
- Atmospheric precipitation (snow)
- Radiation environment
- Meteorological parameters.

SC UEIP performs monitoring of radiation, ecological situation and natural environment using three systems:



### 5.1 ACRC. Radiation Monitoring and Meteorological Observations

For the purpose of radiation environment control, Environmental Protection Department (EPD) applies the Information & Measuring Automated System of Radiation Control (ACRC), which is an integral part of ROSATOM Unified State Automated System of Radiation Control. The system is designed for constant automatic control of radiation and meteorological conditions in monitoring points connected to the control panel. At present SC UEIP ACRC is equipped with the advanced equipment.

Seven control stations cover all industrial sites of the Company. The measuring data for equivalent gamma-radiation dose rate received by SC UEIP Automated System of Radiation Control are daily transmitted to FSUE «ROSATOM Situation-crisis center». Thereafter these data shall be available at web-site [www.russianatom.ru](http://www.russianatom.ru).

The exposure dose rate at UEIP industrial sites and in Novouralsk does not exceed 0.15  $\mu\text{Sv}/\text{hour}$ , which is considerably lower than the standard values and background exposure dose rates specified for Ural region.

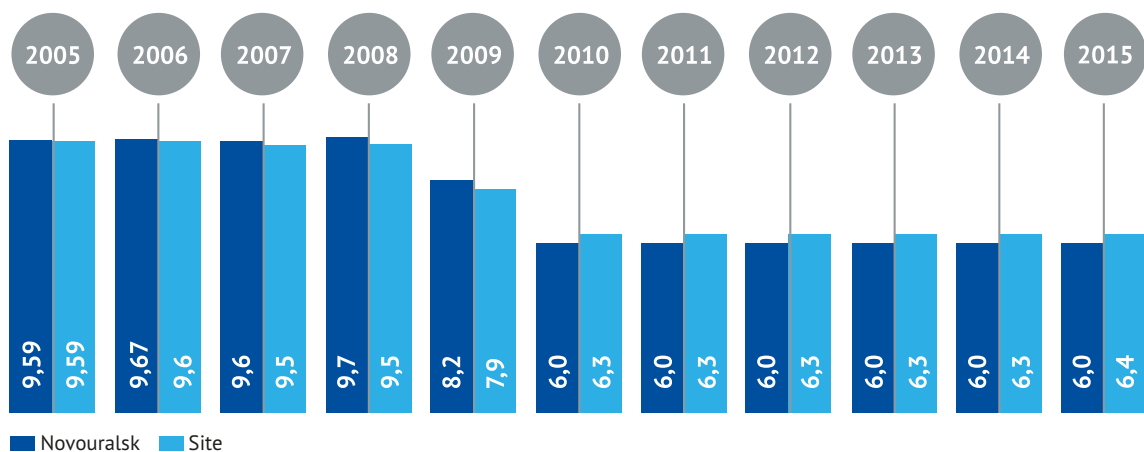


Diagram 1. Exposure Dose Rate,  $\mu\text{R}/\text{hour}$

## 5.2 Monitoring of Natural Environment

Industrial environmental and ambient monitoring is carried out by SC UEIP Environmental Protection Department. The monitoring activity shall be performed by the agencies accredited by Technical Regulation & Metrology Federal Agency. SC UEIP annually makes work contracts with these agencies.

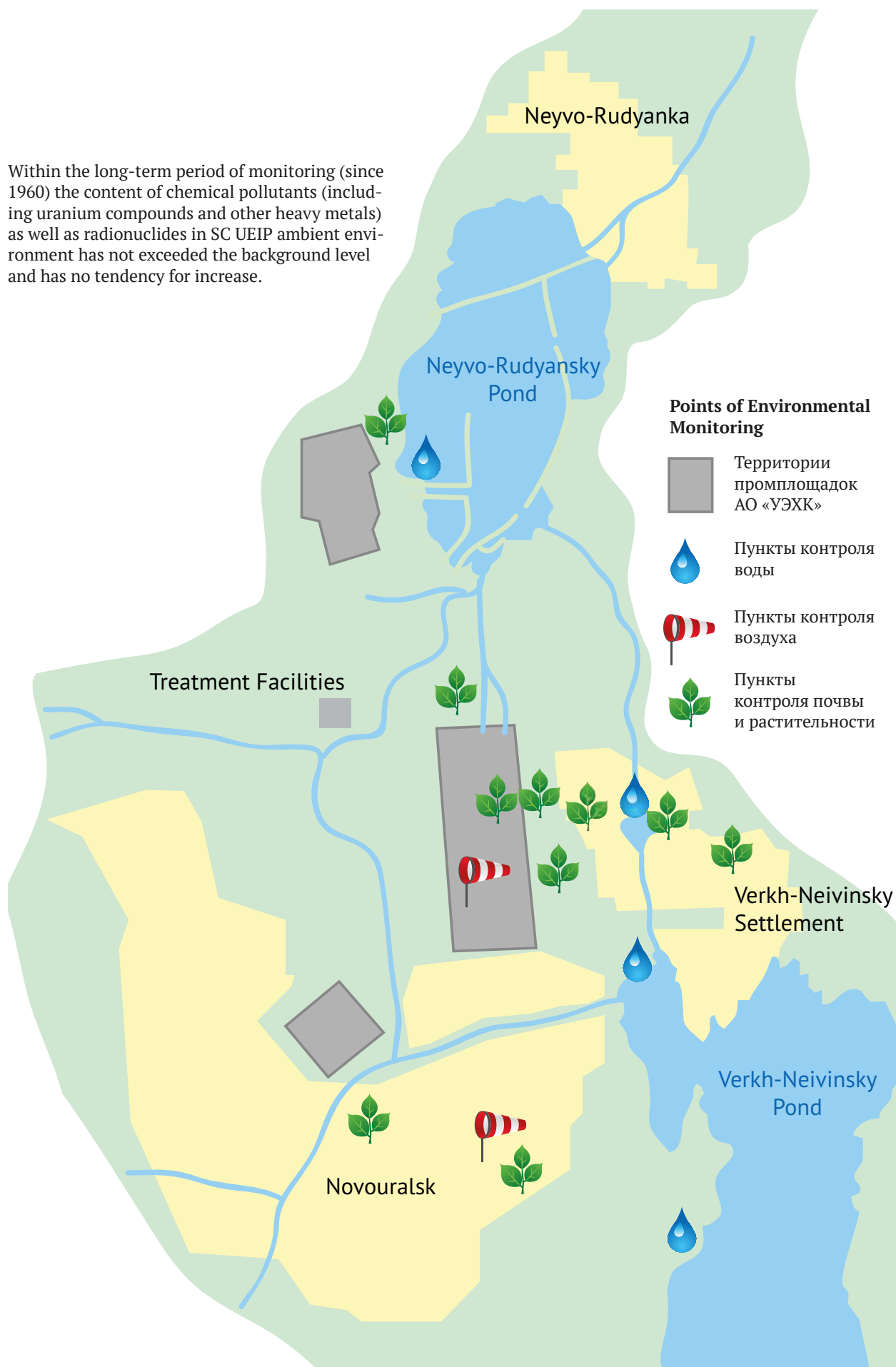
### Results of Long-term Measurements Are As Follows:

- The content of radionuclides in ambient waters is approximately 150 times below the sanitary standards.
- The content of radionuclides in Novouralsk and SC UEIP site ambient air does not exceed the background level and is approximately 270 times below permissible limit.
- The radionuclide content in soil does not exceed the background level.



Брифинг по вопросам охраны окружающей среды и экологической безопасности комбината (слева-направо: начальник ООС Наливайко А.В., заместитель Генерального директора – Технический директор Лобов Е.М., инженер 1 категории по охране окружающей среды Носков М.В.)

Within 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 SC UEIP ambient environment has not exceeded the background level and has no tendency for increase.



## 5.3 SC UEIP Subsurface State Monitoring

In order to ensure regulation of SC UEIP ambient waters quality and control of process water supply to the site it was necessary to determine the laws of dynamics, structure, chemical composition of underground waters. For this purpose the Company established a secure network of supply wells and monitoring stations to control the aquifer hydrodynamic status and water quality. Methods, techniques and means of observation of well ties, sample procedures, laboratory analyses of water samples and other procedures were tested.

Introduction of qualitatively new system of subsurface state monitoring makes it possible to obtain the accurate data for substructure of radioactive waste storage facilities located at the site, as well the data on the underground hydrosphere state. 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.

The work on installation of subsurface state monitoring system included geological, geodesic researches of SC UEIP radioactive waste storage facilities» locations, camera treatment of researches performed during

the previous years. The research of change in geoecological environment indicators was conducted, the analysis of the site geological and hydro-geological structure was performed, geological and hydro-geological cross sections were made. Following the results of this work the observation well network beyond the SC UEIP underground waters was approved and established. The geoinformation system was introduced.

The purpose of researches is to confirm that SC UEIP nuclear hazardous facilities do not affect negatively on the underground waters, and that the influence of the underground waters on these facilities will not result in population and personnel radiation and toxic exposure, and natural environment contamination by radioactive and chemical substances.

The results of work were published for scientific practical conferences «Geo-ecological issues of water objects protection at enterprises of nuclear industry» which were held in 2013-2015. Subsurface state monitoring results were discussed in sessions of scientific and technical council of FSUE «Hydrospetzgeologiya» devoted to technical support of subsurface state monitoring at Rosatom State Corporation enterprises.

### The Population Is Free From Radiation Exposure

In 2014 the Company experts developed the science-based reference levels. Correspondence to these levels absolutely confirms the zero level of the Company environmental effect («zero» level of environmental impact). As for the environment components, these reference levels were not exceeded.

**Table 1. Main monitoring objects in sc ueip zone of influence**

Natural Environment	Zero Level	Actual Content
Ambient waters, µkg/l	2,2	0,02 – 0,03
Ambient air, µBq/m <sup>3</sup>	0,33	< 0,13
Vegetables – potatoes, µkg/kg	2,4	0,2-0,9
Vegetables – except potatoes, µkg/kg	1,7	0,3-0,6
Grassland, µkg/kg	135	0,015 – 0,021





Участница фотоконкурса «Краса Уральских гор» Городкова Елена. «Ожидание»





## 6. Environmental Impact

### 6.1 Water Withdrawal from Water Sources

To ensure the production process SC UEIP takes water from Verkh-Neivinsky, Neivo-Rudyansky and Ayatsky water basins and water supply system of Municipal Unitary Company MUP Vodokanal. Water sources are used for the supply of enrichment production external outline cooling systems, thermal power plant (TPP) hot water supply system, and may be also used as drinking and service water.

Recycling water supply is performed as follows:

After equipment cooling water is discharged through the training channels into the basins separated by dams from the main water bodies of Verkh-Neivinsky and Neivo-Rudyansky basins. Water in the basins is cooled and after that is supplied again to the process facilities by means of pumping stations.

#### Water Supply Sources» Characteristics

Verkh-Neivinsky water basin is used for drinking water supply to NGO population and process water supply to the Company. The water intake significantly impacts the water basin (more than 5% of average annual volume of water body). The total storage capacity of Verkh-Neivinsky water basin is 47.9 million m<sup>3</sup>. The water body is not

qualified as nationally or internationally protected area. With relation to biodiversity the water basin is not valuable. It serves as centralized drinking water supply and as recreation area for Novouralsk and Verkh-Neivinsky settlement population.

Neivo-Rudyansky water basin is used for the Company process water supply. The total storage capacity of water basin amounts to 11.3 million m<sup>3</sup>. The water intake significantly impacts the water basin (more than 5% of average annual volume of water body). The water body is not classified as nationally or internationally protected area. With relation to biodiversity the water basin is not valuable. Generally it is used as waste water receiver for NGO industrial and public utilities (including SC UEIP).

Ayatsky water basin is used as a reserve source for adding water to Verkh-Neivinsky water basin in low water years. It also serves for water supply to collective gardens. The total storage capacity of water basin amounts to 61.9 million m<sup>3</sup>. The water intake does not significantly impact the water basin (less than 5% of average annual volume of water body). The water body is not treated as nationally or internationally protected area. With relation to biodiversity the water basin is not valuable.

**Table 2. Water withdrawal from natural water sources**

Source Description	Water Intake, thousand m <sup>3</sup> /a								
	2007	2008	2009	2010	2011	2012	2013	2014	2015
Verkh-Neivinsky water basin	4 868	4 970	5 081	5 004	4 578	3 978	3 651	3 052	2 798
Neivo-Rudyansky water basin	1 575	1 733	1 364	1 459	1 243	1 178	1 171	638	540
Ayatsky water basin	21	34	26	48	5 483	32	26	17	7
Utility and drinking water supply for Tavatuy holiday camp	75	77	78	57	55	50	60	0	0
Artesian wells	519	506	459	658	616	655	0	0	0
Total	7 058	7 320	6 978	7 226	11 975	5 893	4 908	3 707	3 345

**Table 3. Economy of fresh water due to recycling and reuse of water supply**

Consumption in circulation water supply systems, thousand m <sup>3</sup> /a								
2007	2008	2009	2010	2011	2012	2013	2014	2015
199 088	194 551	186 824	187 779	181 942	182 807	175 298	160 598	160 723

## 6.2 Discharge of Chemical Pollutants

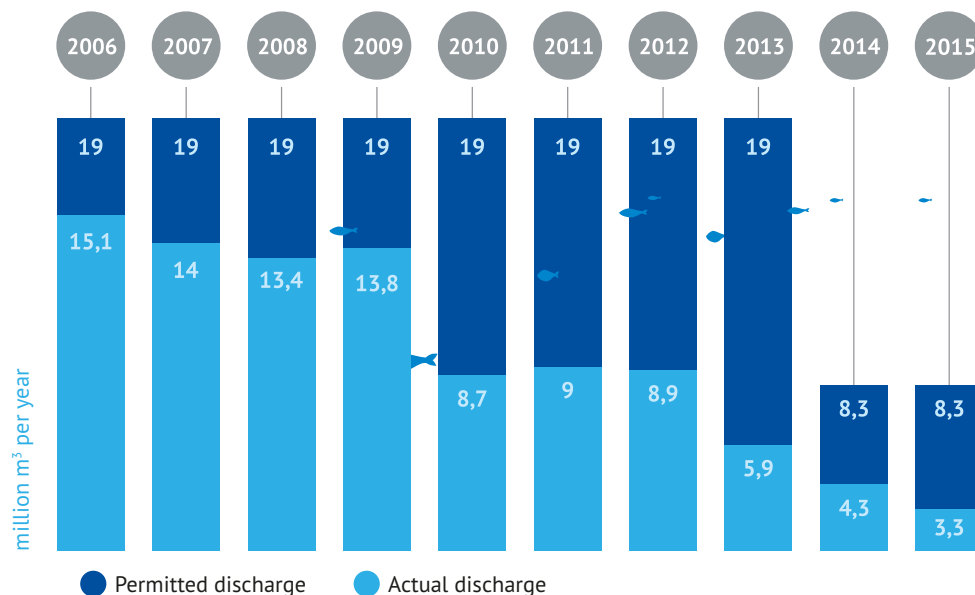
In 2015 SC UEIP discharged waste waters through 3 discharge outlets. Permissible discharge limits (PDL) were specified for every discharge outlet. Permits for discharge of pollutants with waste waters were obtained. Ministry of natural resources of Sverdlovsk region issued «Decisions on granting of water bodies for waste water discharge». In accordance with new «Decisions ...» approved in 2014 SC UEIP was permitted to discharge up to 8.3 million m<sup>3</sup> of waste waters into the surface-water bodies. According to the process inspection data the actual

volume of discharge in 2015 amounted to 3.3 million m<sup>3</sup>. The waste water category is partially clean water. The main waste water receiver is Neivo-Rudyansky water basin. Off-schedule discharges are not performed. Pollutant content shall not depend on average dryness of the year. Discharges of polluting substances of similar concentration are performed during the year. Decrease of waste water discharge was achieved due to integrated energy saving program «SC UEIP Energy saving and energy efficiency enhancement in 2011-2020».

**Table 4. Composition of discharge in 2015 by basic pollutants**

Description of basic pollutants	Class of hazard	Permissible discharge limit, t/a	Actual value of discharge in 2015	
			t/a	% of limit
Petroleum products	4	1,24	0,2	16
Suspended substances	4	87,2	21,4	24
Dry residue	N/A	2113	647,7	31
Ammonia nitrogen	4	5,6	0,59	10
Nitrites	2	2,07	0,29	14
Phosphorus	3	0,69	0,29	42
<b>Total, only by basic pollutants</b>		<b>2209,8</b>	<b>670,47</b>	<b>30</b>

**Diagram 2. Waste water**

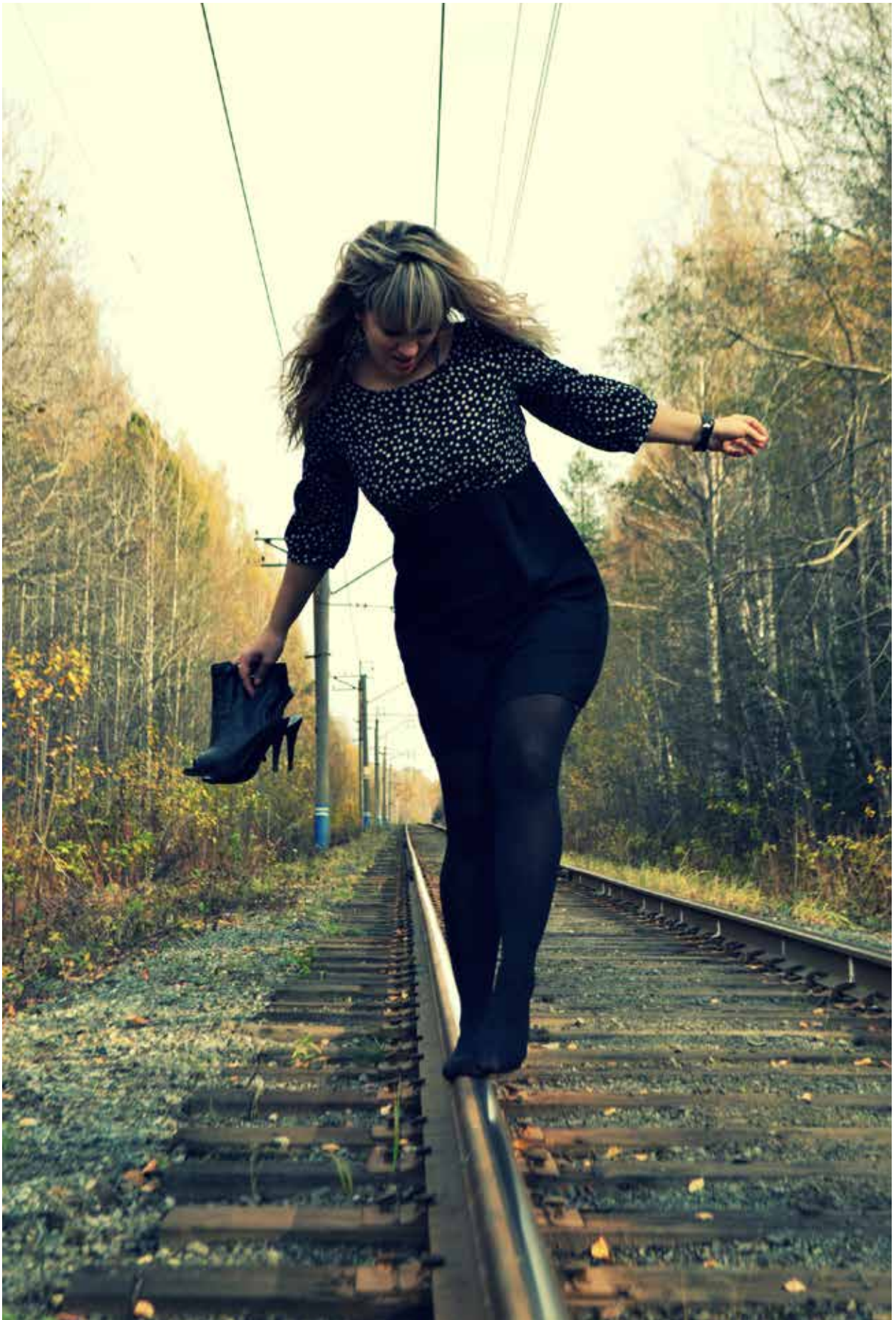


## 6.3 Radionuclide Discharge

For the past several years SC UEIP systematically carried out activities focused on termination of discharge of waste waters, containing radionuclides. *This work resulted in termination of radionuclide discharge into surface-water bodies in 2006.*



Участница фотоконкурса «Краса Уральских гор» Макурина Марина. «На пленэре» с. Чусовое



Участница фотоконкурса «Краса Уральских гор» Камалова Мария. «На встречу бесконечности»

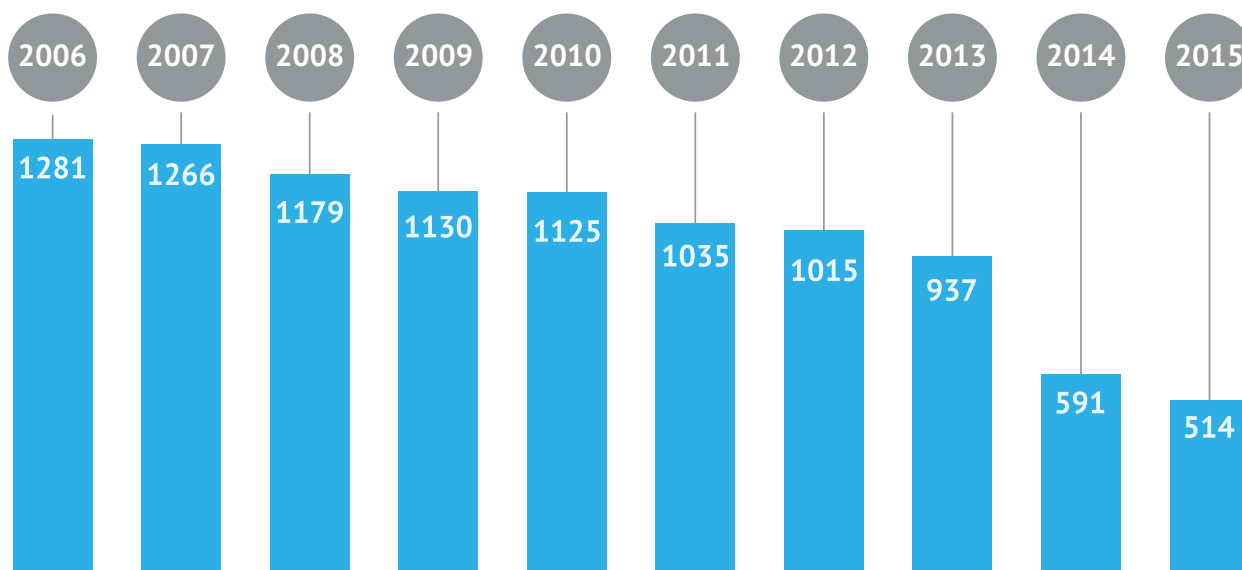
## 6.4 Emissions of Chemical Pollutants

The authorized emissions of chemical pollutants amount to 1647 tons a year. In 2015 the actual emission volume made 514 tons, i. e. amounted to ~ 30% of maximum permissible level. It should be noted that the greater part of emissions is provided by SC UEIP heat-and-power plant which supplies heat and hot water not only to the process facilities but also to Novouralsk houses and social facilities.

The Company emission control is provided in accordance with annual «Schedule for emission control»,

approved by SC UEIP Technical Director. TPP emissions (more than 80% of SC UEIP total emissions) and also hydrogen fluoride emissions from all emission sources of enrichment production are controlled by means of instrument procedures. The limits for other emissions are determined using duly approved procedures based on emission calculations as per specific values.

**Diagram 3. Air emissions (t/year)**



**Table 5. SC UEIP Basic chemical pollutant emissions over the last decade**

Basic pollutants	Permissible emission for 2015, t.	Actual emission, ton											% of permissible limit in 2015
		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015		
Sulfur dioxide, 3d class of hazard	57	2,8	2,7	3	5,8	6	4	3,8	3,5	5	3,7	6	
Carbonic oxide, 4th class of hazard	227	23	22	22	50	42	45	40	50	61	29	13	
Nitrogen oxide in equivalent of NO <sub>2</sub> , 3d class of hazard	1123	940	928	854	803	785	740	875	834	475	431	38	
Other: Solid, gas and liquid	—	315	313	300	270	292	246	97	50	50	49	—	
<b>Total</b>	<b>1647</b>	<b>1312</b>	<b>1281</b>	<b>1266</b>	<b>1179</b>	<b>1129</b>	<b>1125</b>	<b>1034</b>	<b>1015</b>	<b>591</b>	<b>514</b>	<b>31</b>	

## 6.5 Greenhouse Gas Reduction Initiatives and Achieved Reduction

The Company implements the Program for «SC UEIP Energy saving and energy efficiency enhancement in 2011-2020». The Program effectiveness is confirmed by the yearly changes in direct greenhouse gas emissions in the course of organic fuel combustion and indirect emissions in the course of energy consumption.

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

Material (substance)	Greenhouse Gas Emission					
	2010	2011	2012	2013	2014	2015
For all types of emissions in CO2 equivalent (Direct)	510 367	476 669	452 650	422 560	419 762	356 986
For all types of emissions in CO2 equivalent (Indirect)	832 034	798 310	778 478	736 839	729 469	734 215

**Table 7. Rate of greenhouse gas emissions**

Material (substance)	2011	2012	2013	2014	2015
Total direct and indirect greenhouse gas emissions, t	1 308 324	1 265 323	1 191 260	1 178 047	1 091 201
Volume of annual revenues from products (services) sales, mln. rubles	19 550	19 840	19 400	20 543	20 523
Rate of greenhouse gas emissions / annual revenues from product sales, tons /mln. rubles	67	64	61	57	53

## 6.6 Radionuclide Emissions

Chart 5 shows the results of radionuclide emission control. According to the Chart, SC UEIP radionuclide emissions are within 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.. Allowable emission for 2015 makes 0.55 Gbq/year.

**Table 8. Results of radionuclide emission monitoring**

	Atmospheric emission				
	2011	2012	2013	2014	2015
Total atmospheric emission of long-lived alpha-active radionuclides, Gbq/year	0,184	0,123	0,140	0,103	0,098
Allowable emission, Gbq/year	7,4	7,4	2,0	0,92	0,55
Quota of allowable emission, %	2,5	1,7	7,0	11,1	17,8

## 6.7 Production and Consumption Waste Management

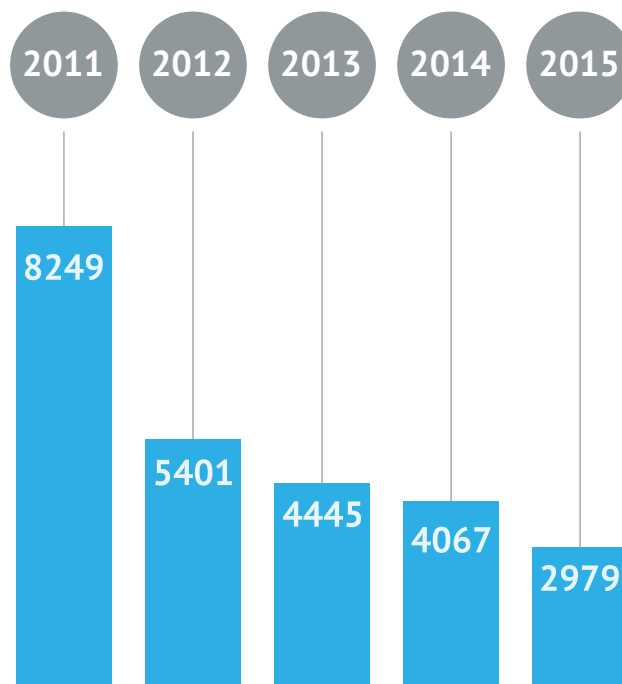
The Company obtained all waste management permits for production and consumption waste management. The established waste generation limits were not exceeded. The most part of waste volume is transferred for

further reprocessing to the authorized companies. Annually SC UEIP performs organizational and technical activities focused on reduction of waste volume generation.

**Table 9. Dynamics of production and consumption waste generation in 2009–2015, t/year**

	2010	2011	2012	2013	2014	2015
Total waste generation Including:	21041	8249	5401	4445	4067	2979
1st class	9	9	7	5	29	8
2nd class	28	23	0	1	0	0
3d class	377	299	150	320	114	19
4th class	6577	3197	1428	1510	1241	578
5th class	14050	4721	3816	2609	2683	2374
Quantity of used and disposed waste	23901	8501	9537	119	46	0
Waste generation limit	42580		25930		4500	

**Diagram 4. Production and consumption waste generation, t/year**





## 6.8 Radioactive Waste Management

In the course of SC UEIP nuclear facility operation leads to generation of Solid Radioactive Waste (SRW) at different stages of production process. In accordance with the results of monitoring, SRW are classified as low-active and medium-active waste in compliance with OSPORB-99/2010 regulations. The most of SRW collected at the Company facilities is subject to reprocessing and compacting. After reprocessing SRW packages shall be transferred to SC UEIP SRW storage facility, that is safe and isolated from the environment.

Decontaminating uranium-bearing solutions shall be reprocessed by means of special technology. Improvement of uranium-bearing solution reprocessing technology in 2005 made it possible to reduce the content and activity of radioactive substances in such solutions to the levels which allow to classify them as nonradioactive discharged water.

The main SC UEIP principles and criteria for SRW management shall cover the personnel, population and environment radiation safety meeting the radiation safety regulations and radiation protection requirements.

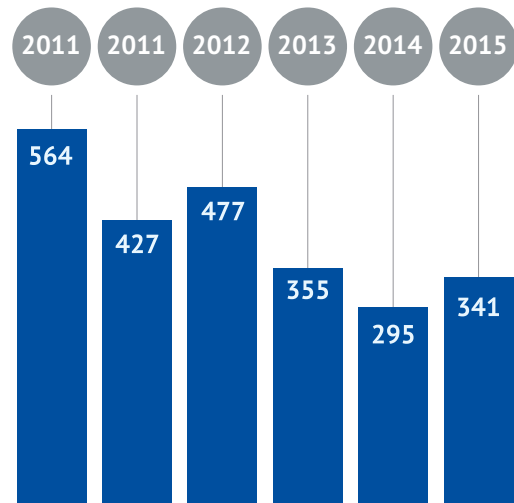


Diagram 5. Solid radioactive waste generation, m<sup>3</sup>

## 6.9 Energy Use

SC UEIP is committed to introduction of energy-saving technologies and cost saving. The Program on “SC UEIP Energy saving and increase of energy effectiveness in 2011-2020» was developed, approved and launched as per investigation carried out in 2010. The Program covers the effective use of energy resources and reduction of energy loss due to change in personnel behavior, and production process upgrade.

### Effective Use of Energy Resources & Energy Loss Reduction

The energy saving plans were successfully fulfilled in all SC UEIP subdivisions. Energy saving plans for 2016 were developed and approved. The cost saving target values are included into the integrated optimization plan developed by the Company subdivisions. The plan performance is reviewed during making up the results of production competition among the Company subdivisions.

The Company plans and conducts the following organizational and technical activities:

- optimize (reduce) the power equipment in operation as per the requirements of enrichment and non-core production
- ensure changeover of process shop ventilation systems to the thermal energy generated from process operations
- optimize the vent modes
- bring the site and process facility lighting system in balance with the personnel work schedule.

SC UEIP initiatives and activities in the field of energy saving shall be conducted in accordance with Rosatom State Corporation long-term provisions. It should be noted that the reduction of power consumption is fulfilled under the stable use of production capacities due to systematic integrated optimization.

Table 10. Energy consumption

	2010	2011	2012	2013	2014	2015
SC UEIP power consumption, thousand kW/h	1 225 585	1 190 212	1 156 060	1 095 121	1 068 888	1 006 733
SC UEIP thermal energy consumption, Gcal	999 678	790 081	712 260	695 726	667 107	591 284
Total energy consumption, GJ	8 600 757	7 595 203	7 146 185	6 857 528	6 643 175	6 101 719



Участница фотоконкурса «Краса Уральских гор» Хаматгариева Анна.  
«Я свободен, словно птица в небесах»



Участница фотоконкурса «Краса Уральских гор» Кириллова Владилена. «Царица Уральских гор»»

## 6.10 Share of SC UEIP Emissions, Discharges & Waste in Sverdlovsk Region

SC UEIP share in total volume of chemical pollutants (ChP), radionuclide emissions and discharges both in Sverdlovsk region and across Rosatom State Corporation enterprises makes less than 1 percent.

**Таблица 11. Comparison of total volume indicators across the territory**

Indicator	Territory Total Volume	SC UEIP Total Volume	SC UEIP Share
ChP emissions, thousand tons	1 021*	0,5	< 0,05 %
Discharges (volume of discharged waters), million m <sup>3</sup>	949*	3,3	< 1 %
Production and Consumption Waste, million tons	185*	0,003	< 0,01 %
α-emitting nuclide emissions, GBq	9,49×10 <sup>9</sup> **	0,05×10 <sup>9</sup> **	< 1 %
Discharge of radionuclide containing water, million m <sup>3</sup>	1,56×10 <sup>9</sup> **	0	0

\* — Total volume in Sverdlovsk region in 2014.

\*\* — Total volume across JSC TVEL companies in 2014. The given values of radionuclide emissions and discharges do not exceed the RF permissible limits.

## 6.11 State of SC UEIP Site

There are no territories polluted by radionuclides within UEIP site and health protection zone. Gamma-radiation equivalent dose rate does not exceed the natural background and amounts to 0.06-0.12 μSv/hour (the average value — 0.09 μSv/hour). Within the long period of SC UEIP operation there was no emergencies, spills, etc., resulted in environmental contamination. SC UEIP radiation hazard category is specified by the «Classification of SC UEIP as radiological facility on the basis of potential hazard in accordance with requirements of General Sanitary Rules of Radiation Safety (OSPORB-99/2010)» approved by the RF FMBA territorial body. In compliance with this classification SC UEIP is referred to the III category of potential radiological hazard. Thus SC UEIP control zone is not specified.

Sanitary protection area for SC UEIP regarded as the nuclear hazardous facility is regulated by SC UEIP Sanitary Protection Zone Project, approved by the Head of NGO and SC UEIP General director. The Company facilities occupy the area (incl. lease land) of 11 053.14 hectares (including buildings, roads, agricultural land). The total site area makes 512.3 hectares. The Company land assets do not include the conservation areas and valuable biodiversity territories.



## 7. Implementation of Environmental Policy

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Environmental safety is the nuclear industry priority and the mandatory requirement for nuclear energy technology development and nuclear facilities operation. Moreover, despite of nuclear industry sustainable development, technology and security upgrade, the strength of nuclear industry position is closely connected with its ecological and social acceptability. It greatly depends on conditions for radioactive waste volume reduction, development of safe waste disposal technology, development of decommissioning technology and the proper solution of «nuclear heritage» problem.

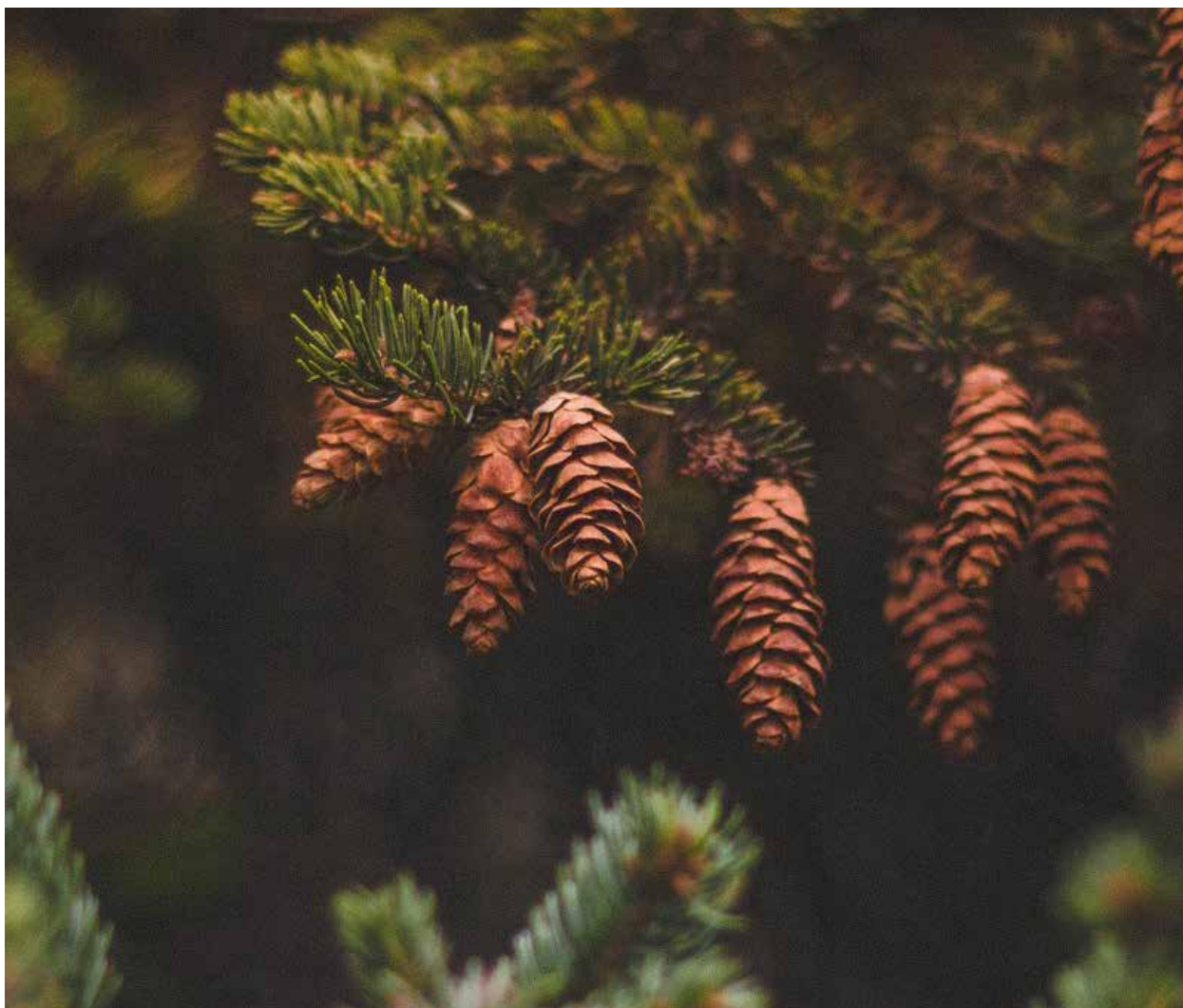
SC UEIP scope of activity is of great strategic importance for Novouralsk Urban District development since it greatly contributes to its innovation progress. In this connection SC UEIP management understands the need for providing balance between strategic objectives for corporate business development and environmental safety, which is 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 of economic and environmental values. Practically it is implemented by means of technical upgrade, retrofit and energy saving corporate programs, as well as detailed

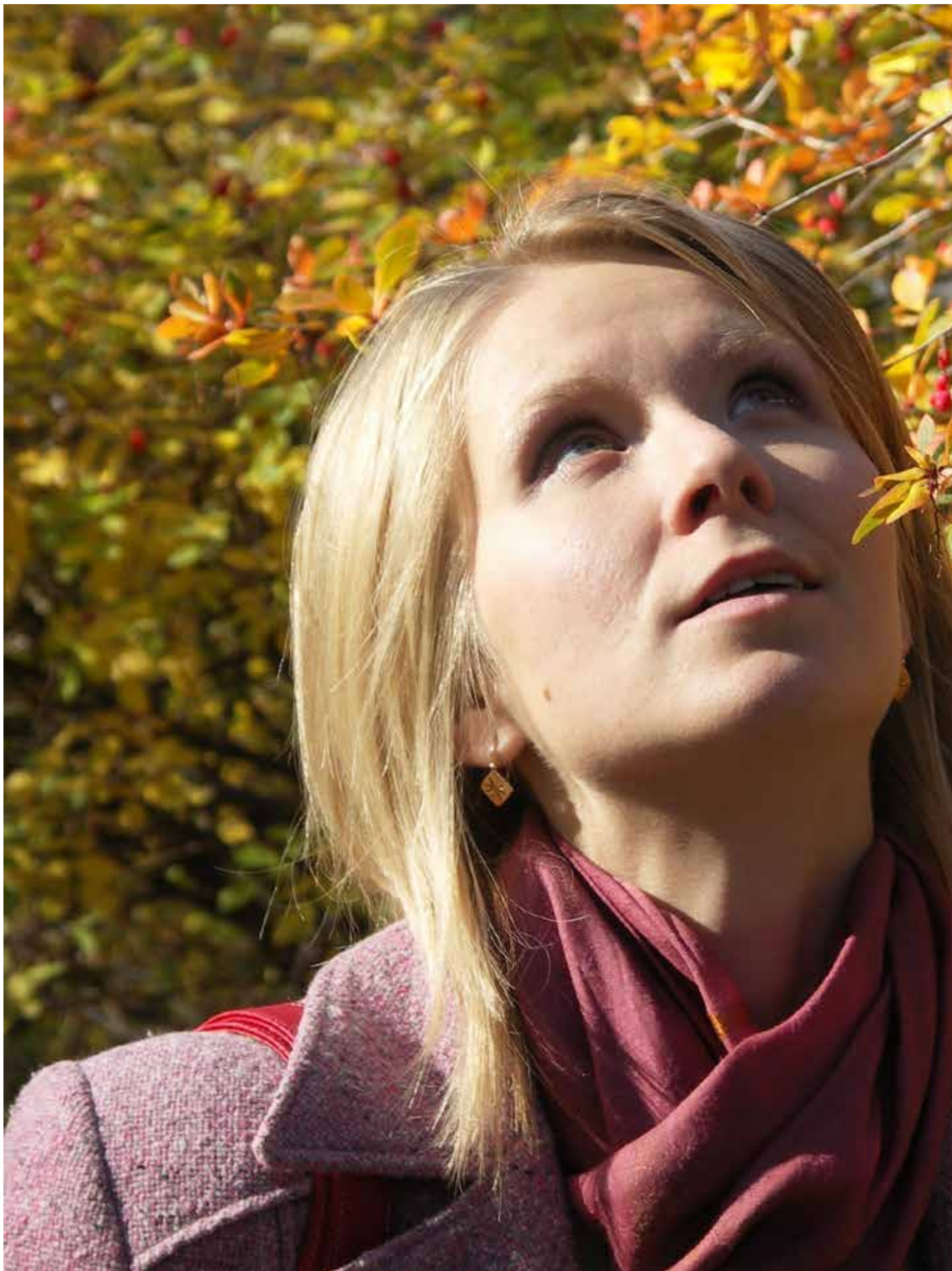
assessment and minimization of potential environmental risks in the course of new build projects. Increase in environmental and production power efficiency is the mainstream of the Company strategy, a key element of environmental management system and environmental policy. SC UEIP advanced multilevel environmental management system involves qualified scientists and engineers and meets the modern management efficiency criteria in this sphere. The comprehensive approach to a problem solution in the field of conservancy and environmental protection enables SC UEIP to achieve all intended environmental purposes, minimize environmental risks and increase social responsibility of business.

In 2015 the Company developed and introduced several basic documents comprising all planned activities related to industrial and environmental safety:

1. Long-Term Plan for SC UEIP Environmental Policy Implementation up to and including 2018.
2. Annual SC UEIP Environmental Program.
3. Annual schedule for monitoring of environmental objects, emissions and pollutant discharges.

All activities of «Plan...», «Program...» и «Schedule...» planned for 2015 were fully implemented in due time.





Участница фотоконкурса «Краса Уральских гор» Болтрукевич Екатерина. «До свидания, Осень»



## 7.1 Initiatives on Mitigating Product & Service Environmental Impact, Scope of Mitigation Procedures

Operational safety of SC UEIP nuclear facility (NF) and its systems and components is ensured by the successive implementation of defense in depth. Application of physical protection system on the way of ionization radiation, nuclear material and radioactive material penetration into the environment, from primary package wall (vessel, pipeline) to building structure and roof, is the main method of the accident prevention. SC UEIP NF operation safety comprises protection of physical barriers, assurance of their operability within a given lifetime and personnel and environment protection procedures. For this purpose SC UEIP performs a complex of special activities to prevent emergencies that can cause the process equipment seal failure (abnormality of process

conditions, violation of equipment operation conditions and limits, self-sustained chain reaction, fire, load fall, mechanical or corrosion damage, etc.). Radiation accident management and control are also provided.

NF safety achieved by SC UEIP and other activities in the sphere of nuclear energy use is ensured primarily by technical measures and decisions taken during design of equipment, systems, NF components, and also by development of procedures on nuclear material, radioactive substance and radioactive waste handling.

Implementation of measures on mitigation of adverse environmental impact is one of the mainstreams of the Company Environmental Policy.

**Table 12. Current environmental costs in 2015, thousand rubles**

Type of environmental activity	Annual current (operating) costs	Of which at the Company's expense
<b>Total</b>	<b>757 245,2</b>	<b>757 245,2</b>
Including:		
Atmospheric air protection	127 150,1	127 150,1
Collection and purification of waste water	317 012	317 012
Waste management	1 183,4	1 183,4
Environmental radiological safety	311 329,9	311 329,9
Other types of environmental activities	569,7	569,7

**Diagram 6. Current Environmental Costs, mln. rubles**

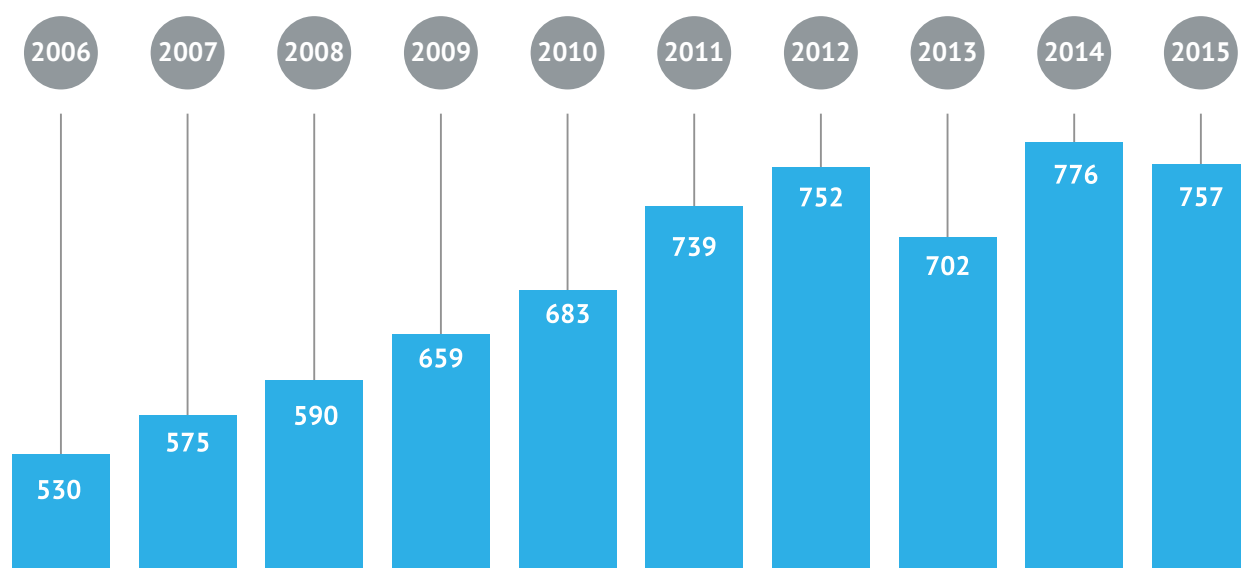




Diagram 7. Environmental permanent investment data, thousand rubles

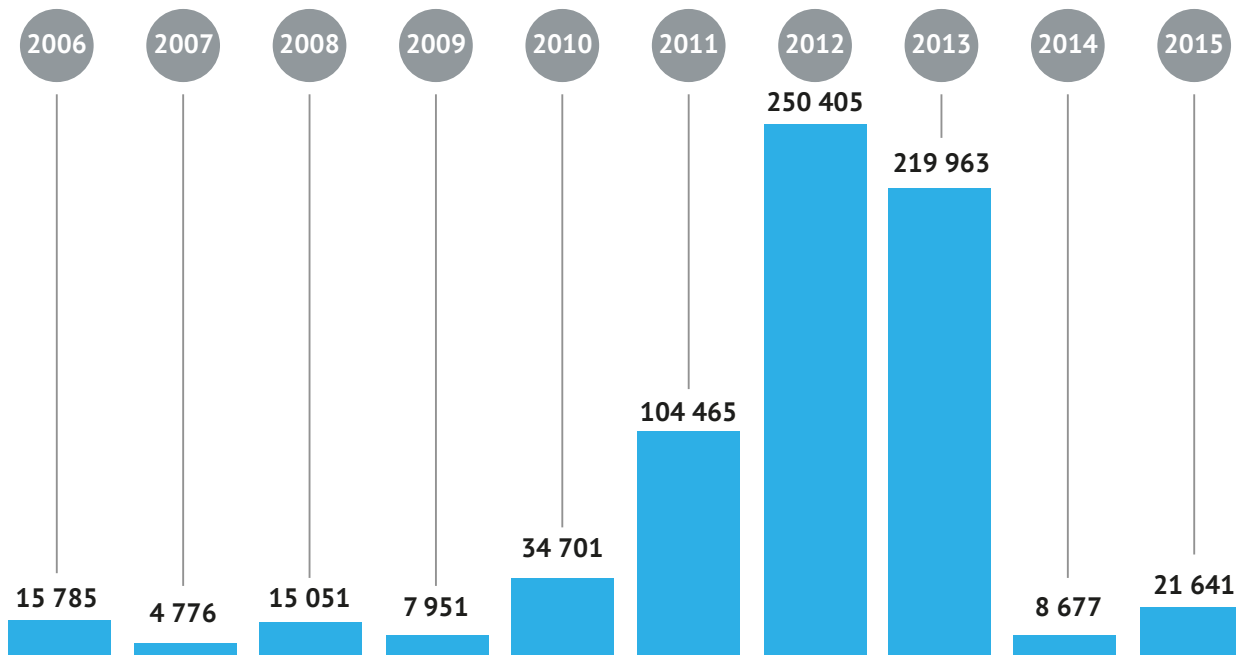


Table 13. Structure of pollution charges, thousand rubles

Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Pollution charges	310	276	327	337	387	339	315	292	192	182
Incl. water bodies	98	56	75	131	96	103	105	84	64	60
Ambient air	155	138	130	148	285	233	210	208	128	122
Waste disposal	57	82	122	58	6	3	0*	0*	0*	0*

\*— Graduated payment rate – the product of chargeable rate by coefficient (taking into account environmental factors, in this context – reductive). Thus chargeable rate for production and consumption waste disposal within the specified limits are applied using zero coefficient in case of waste disposal in compliance with statutory requirements (RF Governmental Regulation No 344, Federal Law No 309-FZ).

Assessment of efficiency of implemented initiatives on mitigating environmental impact in 2015:

- SC UEIP subdivisions kept to the specified standards for chemical pollutant (ChP) and radionuclide emissions and discharges
- Environmental safety regulations were observed
- Volume of discharge waters into surface-water bodies was decreased by 25%
- Emission of chemical pollutants was decreased by 13%
- Volume of production and consumption waste was decreased by 27%
- Total energy consumption was decreased by 541 456 GJ.

**Производственная система Росатом (ПСП)** — методически целостный отраслевой комплекс взаимосвязанных производственных процессов, в которых действия, не создающие ценность, сведены к минимуму в результате последовательных улучшений при помощи принципов, правил, инструментов и методов.



Участница фотоконкурса «Краса Уральских гор» Колосова Ольга



## 8. Environmental Education

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SC UEIP is committed to environmental education. One of the Company environmental policy mainstreams is to ensure transparency and public availability of information regarding UEIP environmental protection and safety activities. More than 90 news materials were published in corporative, local, regional and branch mass media in 2015. The information covered the issues on the Company environmental activities and environmental conditions within the territory of presence. According to the «transparency» policy pursued by SC UEIP, 11 ecological press-tours to the site were conducted. The tour participants received a unique opportunity to visit the Company process facilities, measure radiation background in

any point of their route and make sure that the plant was of no hazard to the environment. Annually since 2008, the Company publishes Environmental Safety Reports presenting full and objective information about the current environment status and environmental impact resulting from SC UEIP operation. Environmental Safety Reports 2012-2015 were presented to concerned regional public communities. The Report shall be submitted to organizations dealing with SC UEIP on the issues of environmental protection and industrial safety, mass media and public organizations located in Novouralsk city district, and shall be available at SC UEIP official web-site.

### 8.1 Cooperation with Public Authorities

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The proper level of nuclear, radiation, industrial, ecological and labor safety at SC UEIP was confirmed in the course of repeated inspections conducted by the following executive authorities:

- Rostekhnadzor Ural Administration — with regard to industrial safety at UEIP hazardous process facilities;
- Rostekhnadzor Ural Interterritorial Administration

for Nuclear Radiological Safety — with regard to compliance with standards and regulations in nuclear energy use while operating nuclear facility;

- RF FMBA Regional office No 31 — in the field of health legislation requirements compliance at SC UEIP.



**Обсуждение «Совместного инновационного проекта АО «УЭХК» и МАОУ Лицей №58 «Робот-контролер»**

## 8.2 Winners of Branch and Regional Competition

SC UEIP once again became the winner of «Green owl» municipal ecological contest held among production facilities.

The Head of Environmental Department A. V. Nalivajko received the Order of Vernadsky for outstanding achievements in implementation of sustainable environmental development programs.

On June 5, 2015 in State Kremlin Palace the summing-up and ceremony of rewarding the winners of the Ecological Vernadsky Foundation International Project «Ecological culture. Peace and reconciliation» took place as part of special event. SC UEIP presented the Project for integrated environmental impact reduction. By the international jury's decision the Project became the winner in the nomination «Environmental culture in industry and power engineering».

SC UEIP won the 2nd place in the annual contest «Environmentally model company of nuclear industry». The rewarding ceremony took place on December 22, 2015 at Rosatom State Corporation Public Council meeting in Moscow.



Проведение субботника в рамках Всероссийской акции «Зеленая весна»

## 9. Contact details

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