

V. Pinaev  
T. Ledashcheva

2022

# **Environmental support of projects in Russia – modern practices**

**2<sup>nd</sup> edition**

Monograph



УДК 330:574  
ББК 20.18  
Р 65

**Рецензенты:**

Кудрявцева О.В. – доктор экономических наук, Экономический факультет МГУ имени М.В. Ломоносова.

Редина М.М. – доктор экономических наук, Институт экологии РУДН.

**Пинаев, Владимир Евгеньевич**

**Ледашчева, Татьяна Николаевна**

Р 65 Environmental support of projects in Russia – modern practices. 2<sup>nd</sup> edition Экологическое сопровождение проектов в России – современная практика. Издание 2 исправленное и дополненное. Монография – М.: Мир науки, 2022. – Режим доступа: <https://izd-mn.com/PDF/41MNNPM22.pdf> – Загл. с экрана.

ISBN 978-5-907603-36-3

В монографии рассматривается современная практика экологического сопровождения проектов на различных стадиях проектного цикла. Представлены вопросы проведения оценки современного состояния окружающей среды, оценки воздействия на окружающую среду, экологического аудита. Монография может быть полезна при проведении курса оценка современного состояния окружающей среды, оценка воздействия на окружающую среду, экологический аудит, HSE менеджмент на английском языке. Также может быть полезна молодым специалистам – экологам.

С электронным курсом по данной монографии можно ознакомиться на <https://www.openlearning.com/rudn/courses/hse-management-and-audit/>

ISBN 978-5-907603-36-3

© Пинаев Владимир Евгеньевич  
© Ледашчева Татьяна Николаевна  
© ООО Издательство «Мир науки», 2022

## Table of content

<b>Acronyms and abbreviations</b> .....	4
<b>Introduction</b> .....	6
<b>1. MANAGEMENT OF ENVIRONMENTAL BASELINE ASSESSMENT</b> .....	9
EBA TASKS .....	9
EBA PRINCIPLES .....	9
PRELIMINARY CAMERAL STAGE .....	10
FIELD STAGE.....	10
FINAL EBA STAGE.....	11
MAIN TYPES OF INITIAL INFORMATION MATERIALS .....	11
MAIN MAPS .....	11
PLANNING OF FIELD WORKS .....	12
WHAT SHOULD BE INCLUDED IN TO FIELD RESEARCH (WORK) PROGRAM.....	12
AIMS OF FIELD STAGE .....	13
SAMPLE EBA TABLE OF CONTENT REPORT.....	29
<b>2. MANAGEMENT OF ENVIRONMENTAL IMPACT ASSESSMENT</b> .....	33
THE PURPOSE (AIM) OF THE EIA .....	33
THE BASIC PRINCIPLES OF AN EIA .....	33
THE MAIN TASKS OF THE EIA .....	34
PARTICIPANTS AND EXECUTORS OF THE EIA .....	41
MAIN FUNCTIONS OF THE CUSTOMER.....	42
THE FUNCTIONS OF THE DEVELOPER SOLUTIONS ON THE OBJECT.....	42
THE RESPONSIBILITY OF THE PARTICIPANTS OF THE EIA.....	43
THE EIA PROCEDURE .....	43
THE RESULTS OF THE EIA .....	46
TYPICAL CONTENT OF OVOS / PMOOS REPORT.....	48
CALCULATION OF PAYMENTS FOR USAGE OF WATER BODIES .....	50
CALCULATION OF FEES FOR NEGATIVE IMPACT ON ENVIRONMENT (EMISSION, DISCHARGE, WASTES DISPOSAL) .....	51
<b>3. ENVIRONMENTAL MANAGEMENT AND ENVIRONMENTAL AUDITING AT DIFFERENT STAGES OF PROJECT CYCLE</b> .....	55
MAIN TASKS OF ENVIRONMENTAL AUDITING.....	55
PRINCIPLES OF ENVIRONMENTAL AUDITS .....	55
ENVIRONMENTAL AUDIT ACTIVITIES .....	56
STAGES OF ENVIRONMENTAL AUDIT.....	58
METHODS OF ENVIRONMENTAL AUDIT.....	61
ENVIRONMENTAL AUDIT PHASE I.....	62
ENVIRONMENTAL AUDIT PHASE II .....	71
<b>Conclusion</b> .....	85
<b>Literature</b> .....	86
<b>Annex 1. List of RF legislation for monitoring purposes</b> .....	94
<b>Annex 2. Decree of RF Government of 13 September 2016 N 913 On rates of payment for negative impact on the environment and additional factors</b> .....	97
<b>Annex 3 Water consumption fee (Extract form Resolution of the Government of the Russian Federation of December 30, 2006 No. 876 "On the rates of payment for the use of water bodies in federal ownership")</b> .....	108
<b>Annex 4. Typical pre HSE audit questionnaire (general questions only)</b> .....	119
<b>Annex 5. Sanitary classification of industrial facilities and production thermal power plants, warehouse buildings and structures and the size of the approximate sanitary protection zones for them</b> .....	124

---

**Acronyms and abbreviations**

a.s.l.-above sea level

APC – Approximate Permissible Concentration of chemical compounds in soil, set by calculation (tentative standard – 3 year validity period). APC values vary depending on soil type: (a) sand and clay sand, (b) acidic soils (loam and clay) with pH<5.5, and (c) neutral soils (loam and clay) with pH>5.5. APC values may in some instances be used instead of MPC values.

ASF-anthropogenic soil formations

BAT Best Available Techniques

BOD5 5 day Biological Oxygen Demand

BTEX benzene, toluene, ethylbenzene, xylene

CLATI – Center for laboratory analyses and technical measurements of Rospirodnadzor

EBA – Environmental baseline assessment

EDD – Environmental Due – Diligence

EHS - Environment Health and Safety

EIA -Environmental Impact Assessment

EMERCOM – Ministry of Emergency situations Russia

ESAP - Environmental and Social Action Plan

ESHIA – Environmental social health impact assessment

EU – European Union

FGU / FSI – Federal State Institution

FS Feasibility Study

FWCC - Federal Waste Classification Catalogue

FZ – Federal Law

GGTN -Gosgortekhnadzor – Federal Mining and Industrial Supervision Service

GIBDD – State Road Traffic Safety Inspection

GOST-Russian State (branch) Standards

HSE – Health Safety and Environment

IEM-Industrial Environmental Monitoring

ILO - International Labor Organization

IPON-Indigenous Peoples of the North

ISW – industrial solid waste

LVN -Limiting Nuisance Value

MPC d.a.-Maximum Permissible Concentration, daily-average

MPC –Maximum Permissible Concentration of a soil polluting substance. MPC's indicate concentrations which do not cause negative effects, either directly or indirectly, to the natural environment or human health.

MPC o.t.-Maximum Permissible Concentration, one-time

MPD-Maximum Permissible Discharge

MPE – Maximum permissible emission

MSW – municipal solid waste

NGO – nongovernmental organization

OSR – Oil Spill Response

OSRV - Oil Spill Response Vessel

PAH - polycyclic aromatic hydrocarbons

PFAS - Per- and polyfluoroalkyl substances

PMOOS-OVOS - List of environmental protection measures, including EIA

POL - Petroleum, Oil, Lubricants

PPE - Personal Protection/Personal Protective Equipment

---

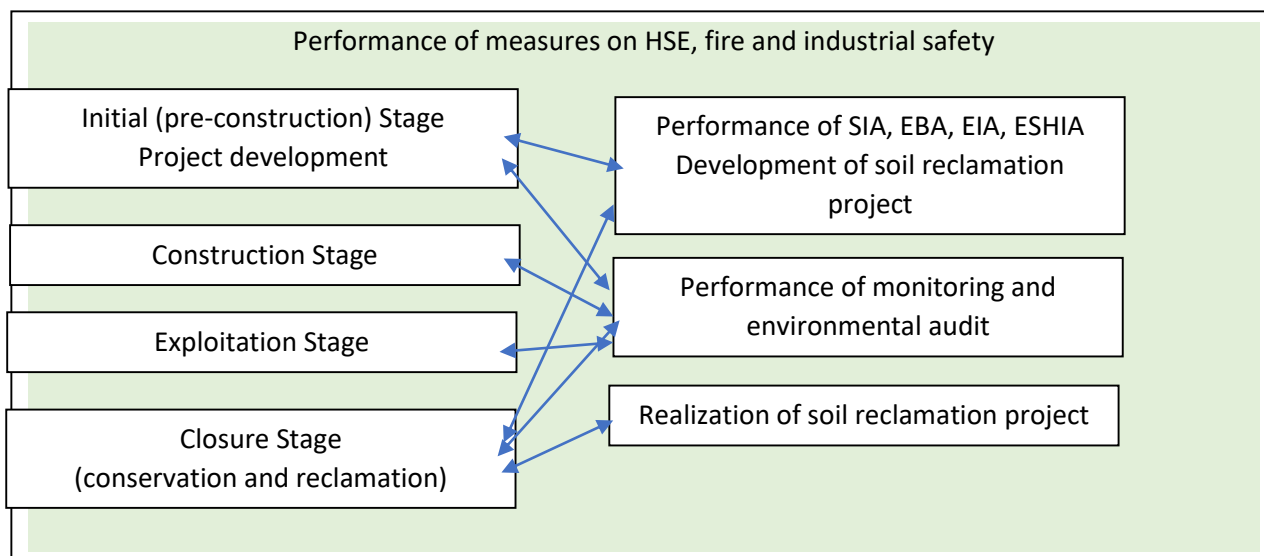
PPM-Personal Protection Means  
 RF – Russian Federation  
 Rosprirodnadzor – Federal Service on Environmental, Technological and Nuclear Supervision  
 RUR – Russian roubles  
 SanPiN-Sanitary regulations and norms  
 SEER – State Environmental Expert Review of RF  
 SER-State Experts’ Review  
 SIA – Strategic impact assessment  
 SLT – site layout  
 SMR-secondary material resources  
 SNiP - Construction Standards and Rules of RF (Building norms and regulations)  
 SMW – solid municipal wastes  
 SOW – solid communal wastes  
 SPNA-Specially Protected Natural Areas  
 SPZ – Sanitary Protection Zone  
 SWL-solid domestic and industrial waste landfill  
 TAE-Temporary Agreed Emissions  
 Thd-thousand  
 TPH-Total Petroleum Hydrocarbons  
 TSEL-Tentatively Safe Effect Level  
 TsLATI-Center of Laboratory Analysis and Technical Measurements  
 UK – United Kingdom  
 UK RFCriminal Code of RF  
 UMC-unfavorable meteorological conditions  
 UPC-Urban planning Code  
 USA – United States of America  
 USSR – Union of Soviet Socialist Republics  
 UVD – Directorate of Internal Affairs  
 VOC-volatile organic compounds  
 WGSWDL – Project on waste generation standards and waste disposal limits  
 WGSWDL-Waste Generation Standards and Waste Disposal Limits  
 WPZ-Water Protection Zone  
 WTS-water treatment station  
 WWTS-waste water treatment station

## Introduction

The monograph is dedicated to modern aspects of environmental support of projects performed at the territory of Russian Federation. You should know that in XXI century graduated environmentalist has to be capable either to cover topics, related to HS, including first aid and fire and industrial safety or be a member of bigger HSE team where others will cover listed HS questions, that narrows career possibilities of young specialist.

We will follow so called “Project cycle structure” – from the very beginning of the project till demolition and the site closure, at all this stages HSE management and auditing is applicable at practice. Visual representation can be seen below at picture 1.

Picture 1. Project cycle structure



Source: Developed by authors

This scheme represents all project stages from green field to brown field and stresses necessity of environmental support each stage and need of fire safety, industrial safety and first aid in case of an accident during activities.

### *Risk assessment*

Risk assessment is based on operational technical specifications/principles, blueprints and working meetings with the participation of key project staff. Health risk decisions can only be made on the basis of the available information and can be modified along with the project implementation; therefore, risk assessment should be regarded as a ‘live’ document able to absorb the emerging new data. Health risk assessment needs to be updated upon a detailed review to include the most explicit task analysis, impact levels and planned monitoring.

In the first place, risk assessment requires the identification of duly registered HSE hazards. Such register of HSE hazards will be different for different industries, incl. social, material and environmental aspects in other words social aspects should be covered by HS, in worst cases First Aid, material aspects – fire safety and industrial safety aspects to avoid damage to material assets and environmental aspect requires follow up of environmental rules to avoid environmental damage and catastrophe. Picture 2 below, presents general risk assessment matrix.

Picture 2. Risk assessment matrix

Impact level	Consequences			Growing probability				
	People	Assets	Environment	A	B	C	D	E
				Never takes place in the industrial sector	Takes place in the industrial sector	An incident took place in the company	Takes place several time a year in the company	Takes place several time a year at this site
<b>0</b>	No health/injury impact	No damage	No impact					
<b>1</b>	Minor health impact/minor injury	Minor damage	Minor impact					
<b>2</b>	Minor health impact/minor injury	Minor damage	Limited impact					
<b>3</b>	Severe health impact/serious injury	Localized damage	Severe impact					
<b>4</b>	Singular fatal casualty	Serious damage	Impact of national scale					
<b>5</b>	Multiple casualties	Extensive damage	Impact of international scale					

Source: Developed by authors

	Low risk
	Average risk
	High risk (unacceptable)

The Risk assessment matrix provided at Picture 2 allows to identify Risk level with respect to it's probability.

Following HSE aspects will be reviewed in the monograph:

1. Management of environmental baseline assessment
2. Management of environmental impact assessment
3. Environmental management and environmental auditing at different stages of project cycle.

For interactive part (including HSE aspects) please address <https://www.openlearning.com/rudn/courses/hse-management-and-audit/>



## 1. MANAGEMENT OF ENVIRONMENTAL BASELINE ASSESSMENT

Environmental baseline assessment (EBA) is first and most significant procedure in the frame of project environmental support for projects of construction, deposit exploration and other types of territory development (See Picture 1 introduction for it's place in project cycle).

Currently additional activity strategic environmental assessment is performed in some cases, but this is more about social and strategic aspects of business than about the environment itself<sup>1</sup>.

Environmental baseline assessment is performed in the frames of environmental engineering research.

To perform environmental engineering research one should visit the target site. In Russia we should bear in mind that this is northern country and field season is limited as in in Norway and Canada.

The main document for Environmental baseline assessment is SP 11-102-97 Engineering environmental site investigations for construction<sup>23</sup> and Code of Rules of the Construction 47.13330.2016<sup>4</sup> "Engineering surveys for construction. Main provisions" (updated version of SNiP 11-02-96).

Aim of EBA (OSSOS in Russian) – to make the base for future Environmental impact assessment, incl. reclamation project.

### EBA tasks

- ✓ Component characteristic of the natural environment of the object (relief, water, soil, vegetation, wildlife, landscapes);
- ✓ Assessment of environmental pollution levels;
- ✓ Creation of geographic information system (GIS) and cartographic materials on EBA \ OSSOS on the territory of the site \ object;
- ✓ General assessment of the disturbance of the environment, including a comprehensive description of the existing technogenic territories;
- ✓ Characteristics of the social environment, including the conservation of traditional environmental management of indigenous peoples;
- ✓ Identification and assessment of environmental restrictions and risks;
- ✓ Development of preliminary environmental recommendations

### EBA principles

**The principle of preventiveness** - an environmental assessment is carried out before making major decisions on the implementation of the planned activity, and also that its results are used in making decisions.

**The principle of complexity** - involves the joint consideration and consideration of the factors influencing the planned activity and the associated changes in all natural environments, as well as in the social environment.

<sup>1</sup> The Social and Environmental Impact Assessment Process according IFC (Electronic source) <https://www.ifc.org/wps/wcm/connect/296ae980488551f5aa0cfa6a6515bb18/ESIA.pdf?MOD=AJPERES>

<sup>2</sup> Legal requirements in Russia have certain structure: on top stand different Code, ie land Code etc, than federal laws, orders of different ministries, SanPins, SP (Construction rules) and GOST

<sup>3</sup> СП 11-102-97 Свод правил / Code of practice Инженерно-экологические изыскания для строительства / Engineering environmental site investigations for construction <https://docs.cntd.ru/document/871001220>

<sup>4</sup> Свод правил СП 47.13330.2016 "Инженерные изыскания для строительства. Основные положения" Актуализированная редакция СНиП 11-02-96 <https://docs.cntd.ru/document/456045544?ysclid=i5tebwbpzn125408757>

**The principle of democracy** - reflects the fact that environmental assessment is not limited to scientific and technical research, but is a tool for making mutually acceptable decisions.

**Main legal requirements for EBA are listed in the following documents:**

Federal Law "On Environmental Protection" № 7-FZ dated January 10, 2002

SP 11-102-97 "Engineering and environmental surveys for construction", M., Gosstroy of the Russian Federation, 1997

SP 47.13330.2016 Engineering survey for construction. Basic principles, 2017<sup>5</sup>

SP 11-103-97 "Engineering and hydrometeorological surveys for construction", Moscow, Gosstroy of the Russian Federation, 1997<sup>6</sup>

**Following activities are performed based on the requirements of the listed documents:**

- Assessment of the current ecological state of the components of the environment.
- Identification of possible sources and nature of pollution of natural components.
- Formation of a geographic information system (GIS) on the current state of the environment as an information basis for environmental monitoring of the territory.
- Assessment of environmental risks and constraints of the planned activity.
- Preliminary forecast of possible changes in the environment.
- Development of recommendations for the prevention, minimization or elimination of harmful and undesirable environmental consequences of the construction and operation of the facility.
- Preparation of baseline data for assessing the amount of compensation for possible environmental damage in the course of the designed activity.

In case of participation of foreign enterprise in the project following international documents are taken into account:

- Policy of social and environmental sustainability IFC (International Finance Corp.) or Rev.-0.1 of 14 April 2010
- Environmental and Social Impact Assessment format / guidance EBRD
- Directive 2001/42/EC of the European Parliament and of the Council on the assessment of the effects of certain plans and programmes on the environment
- Directive 85/337/EEC On the assessment of the effects of certain public and private projects on the environment. Annexes I and II

*EBA has following stages: preliminary – cameral stage, field stage, final cameral stage.*

**Preliminary cameral stage**

1. Collection, analysis and preprocessing of all available stock, cartographic and other information about the territory;
2. Analysis and preliminary interpretation of remote sensing materials (aerial photography, satellite imagery of various types), including a preliminary assessment of the disturbance of the territory and the selection of areas of field work;
3. Preparation of preliminary maps and deciphering schemes;
4. Development of a fieldwork program, including the selection of aerial photography sites, sampling volumes, ground routes and work methods

**Field stage**

1. Airborne visual inspection of the territory of the object;
2. Sampling;

<sup>5</sup> Full text in Russian <https://docs.cntd.ru/document/456045544>

<sup>6</sup> Full text in Russian <https://docs.cntd.ru/document/901704792>

3. Field descriptions on the routes (hiking, all-terrain, boat ...) and points, verification of interpretive schemes and preliminary maps of the environment components - relief, water bodies, soils, vegetation, wildlife, type of ecosystems as a whole;
4. Field mapping of the territory;
5. Aerial photography of technogenic areas, followed by comprehensive ground-based description, sampling and mapping;
6. Identification and description of areal objects of violations (fires, cutting down);
7. Identification and description of hazardous exogenous processes;
8. Preliminary assessment of changes in the structure of the environment;
9. Indication of violations in the soil mesofauna;
10. Determination of environmentally sensitive and rare biotopes;
11. Ethno-ecological studies;
12. Collection of sociological and microeconomic information

### Final EBA stage

Processing field data, analytical work, preparation and execution of reporting materials includes:

1. Laboratory Analytics Samples
2. Text descriptions of the background characteristics of the environment components
3. Drawing up thematic maps in the format of geographic information system (GIS)
4. Development of photographic plans and descriptions of disturbed and threatened territories
5. Preparation of the text and the final report
6. In more details for preliminary stage.
7. Let us proceed in more details

### Main types of initial information materials

- ✓ Design engineering solutions for the construction (arrangement) of the evaluated object;
- ✓ Climatological yearbooks, reference books and other sources of climatological and meteorological information;
- ✓ Hydrological yearbooks and reference books;
- ✓ Reports "On the State of the Environment" - All-Russian and by the subjects of the Federation;
- ✓ Statistical (economic, demographic, etc.) collections, yearbooks and catalogs;
- ✓ Chronicles of nature reserves (if those are located close to the research area);
- ✓ Various reports on R & D, MHE, EIA and other works on the study area and the adjacent areas-analogues;
- ✓ Forest management plans and explanatory texts to them, forest inventory materials;
- ✓ Reports on the status of reindeer pastures (for tundra and forest-tundra zones);
- ✓ Projects of organization and development of forestry (deer pastures);
- ✓ Lists of flora and fauna (annotated lists of plant and animal species) of the area of research (subjects of the Federation, physiographic areas);
- ✓ Red books of federal and local levels;
- ✓ Explanatory notes to specialized maps (engineering-geological, permafrost-geological, etc.);
- ✓ Expedition materials to the study area - typewritten and handwritten reports, field diary entries, photography, field maps, etc. ;
- ✓ The whole possible range of scientific, popular science and scientific literature on the study area.

### Main maps

The basis for creating maps and GIS for the study area is traditionally topographic maps of scales 1: 200 000 - 1: 10 000, depending on the size of the study area and the details of the analysis.

The main source of topographic information at the present time are declassified topographic maps of the main department of the General Staff of the USSR (scale 1: 200,000 is not secret, 1: 100,000 is pArt.board prevention regime, larger is secret).

Topographic maps (topographic maps) reflect the most important information about the territory - relief, nature of vegetation (forests, their type and sometimes species composition, meadows, farmland), hydro-network, settlements, roads and other infrastructure, as well as other objects.

Topographic maps are the only source of information about the relief. Many of the most important thematic layers within the GIS — geomorphology, landscapes, hydrography — are usually created on the basis of topographic maps.

According to topographic maps, satellite images and other distant images of the Earth are attached to geographic coordinates.

Other additional maps:

Geological, hydrogeological, engineering-geological and ecological-geological maps

Cartographic materials of forest inventory, pasture, hunting management

Thematic Atlases

Small-scale regional thematic maps

Regional GIS and electronic atlases

### **Planning of field works**

1. determination of the volume and types of necessary information to be obtained during the field work;
2. identification of typical (key) areas of characteristic (background) natural complexes for a detailed field survey; information about the status of the environment in key areas is then extrapolated to the entire territory of the object based on distance materials;
3. identification of technogenic and other disturbed areas (cutting, burning) to be subject to a field survey;
4. determination of territories and objects for which full-scale clarifications are required after preliminary interpretation and analysis of its results;
5. drawing up a draft aerial survey task (in the absence thereof); based on the objectives of the work and the amount of funding, it is necessary to determine the type of survey - areal, route on supporting transects (permanent routes) or selective (point), as well as routes of aerial visual inspection of the territory;

The result of these works is a detailed field research program.

### **What should be included in to field research (work) program**

- ✓ description of the types of work and justification of their choice;
- ✓ route and semi-stationary works on the assessment of the current state of the environment, with an indication of the grid of routes, approximate points and observations;
- ✓ a sampling and rapid analysis program for assessing pollution levels of the environment (with a sampling chart);
- ✓ work on the assessment of the violation of the environment;
- ✓ the program of aerial photography of disturbed and key areas (digital photography from a helicopter or an aircraft);
- ✓ the program of socio-ecological and ethno-ecological works; these works are often a block isolated from other studies, both in relation to the composition of specialists and the work site, especially in cases of territories with a nomadic or semi-nomadic population;

- ✓ logistics support scheme;
- ✓ ensuring occupational health and safety

Task of field stage - obtain the missing data on the state of the environment of the territory, as well as verify (clarify), update and supplement the available information, including cartographic information.

### Aims of field stage

- Getting data on the background state of the main components of the environment;
- Obtaining characteristics of the content of pollutants in basic environments, as well as the radiation situation - field sampling;
- Obtaining data on the socio-economic situation, land use, etc .;
- Expert assessment of the existing disturbance of the territory, including the complex characteristics of the existing technogenic territories.

#### Following methods are used

**Semi-stationary research** - involve work for some time in a fixed area. Used to characterize the population of fish, small mammals, geomorphological and hydrological processes, etc. Due to the short period of field work, their application is limited.

**Itinerary research** is the most applicable method in EBA works. They allow for a short time to cover a large variety of natural complexes, which, given the presence of pre-compiled pre-maps and interpretive schemes, allows extrapolating data to large areas. These methods are used to characterize the plant and soil covers, animal world (birds, large mammals), landscape characteristics, etc. Routes can be walking, car, all-terrain, boat, helicopter (with landings).

**Dot (local) studies** involve short work in a small area, most often taking samples or measurements. They are used to characterize pollution, soil mesofauna, invertebrate hydrobionts, as well as to compile complex characteristics of technogenic territories based on aerial photography. Can be carried out with brief landings from a helicopter.

**Field surveys** - most often aerial, from a helicopter. Such work should be preceded by other studies. They allow you to get a closer look at the territory, to clarify the preliminary decoding of remote materials and the designated areas for ground surveys.

**Polling method:** are used to study the animal population, especially - hunting and hunting fauna, demographic and ethno-ecological

**Further we will proceed to next chapter EIA, for more details regarding EBA read text part of the course** – there are much more details.

In general words performing EBA gives us information on physical, biological and socioeconomic conditions. This includes the following<sup>7</sup>:

#### Physical Environment:

- **Air Quality**- Information should give us impression of current air pollution.
- **Climate and Meteorology**- Data is required on wind speed and direction, rainfall, temperature etc.
- **Physiography, Geology and Soils**- Data is required on contour mapping, regional geology, surficial soils, soil classification and soil chemical quality.

<sup>7</sup> Based on Environmental Impact Assessment Guidelines of EPA Guyana Volume 3 – Mining, Version 1, August 2000

- **Hydrology**- Data on watershed areas, stream flow statistics, water levels, bathymetry, currents, hazard lands.
- **Hydrogeology**- Data on the groundwater flow patterns, aquifer characteristics (transmissivity, porosity, permeability), depth to water table, piezometric level and ground water quality.
- **Surface Water Quality**- Detailed characteristics of the water bodies on the lease as well as more detailed seasonal characterization of the receiving streams both upstream and downstream as well as any sub watersheds where facilities will be built.
- **Sediment Quality**- Data are required to physically and chemically characterize sediments.
- **Seismology**- Data are required on seismicity including classification of the area, a review of seismic events, and statistics on return frequencies and design earthquakes.

#### Biological Environment:

- **Terrestrial and Aquatic Ecology**- Data collection would include literature sources, interviews with local people and field surveys. Maps should be prepared. Specific emphasis is required to identify endemic plants and animals, rare and hazarded species, fisheries habitat and spawning areas, benthos and plankton species and diversity and use of the terrestrial and aquatic plants and animals by people, wetland areas etc.
- **Marine Studies**- required on benthos, plankton, sediments, mollusks (metal bioaccumulation), salt marshes, mangroves etc.

#### Socio-economic Environment:

- **Socio-economics** - cultural/historic resources (archaeology); indigenous peoples; demographics, infrastructure; employment, income, skills and education; and public health.
- **Land Use**- including parks, reserves, protected areas, residential, commercial, forestry concessions, ecotourism and industrial should be described and shown as appropriate on land use plans.

As we see content of EBA in different countries is similar. Check what are the EBA requirements in your native country or chose some foreign country for identification of such requirements.

EBA is baseline level which will accommodate planned impact from industrial sites. After the end of project cycle it will be necessary to perform reclamation project, adjusting the state of environment to declared baseline level. Main document defining EBA in Russia is SP 11-102-97 Code of practice “Engineering environmental site investigations for construction” it gives general information on performance of EBA.

Engineering and environmental surveys for construction<sup>8</sup> are carried out to assess the current state and forecast possible changes in the environment under the influence of anthropogenic load in order to prevent, minimize or eliminate harmful and undesirable environmental and related social, economic and other consequences and maintain optimal living conditions of the population.

Engineering-ecological researches are carried out according to the established order of carrying out design and prospecting works for stage-by-stage ecological justification of the planned economic activity at development of the following types of documentation:

<sup>8</sup> The concept of "construction" includes new construction, expansion, reconstruction and technical re-equipment of enterprises, buildings and structures.



- 
- ✓ pre-investment-concepts, programs, schemes of sectoral and territorial development, integrated use and protection of natural resources, engineering protection schemes, district planning, etc.;
  - ✓ urban planning-General plans of cities (settlements), projects of detailed planning, projects of development of functional zones, quarters and sections of the city;
  - ✓ pre-project-justification of investments in the construction of facilities, industrial enterprises and complexes;
  - ✓ project-projects and working documentation for the construction of enterprises, buildings and structures.

During the construction, operation and liquidation of construction projects, engineering and environmental studies and surveys should be continued, if necessary, through the organization of environmental monitoring of the state of natural and technical systems, the effectiveness of protective and environmental measures and the dynamics of the environmental situation.

The tasks of engineering and environmental surveys are determined by the peculiarities of the natural environment, the nature of existing and planned anthropogenic impacts and vary depending on the stage of design and survey works.

Materials of engineering and environmental surveys should ensure the development of a Declaration (petition) of intent, urban planning documentation, sections "environmental impact Assessment" (EIA) at the stage of justification of investments and "environmental Protection" (OOS) in the construction project (for PMOOS and OVOS see next chapter).

For the purpose of nature use regulation and environmental protection the system of regulatory documentation at different levels has been established and is currently valid in the Russian Federation. The major groups of documents are itemised below:

- Codes;
- Federal laws;
- Decrees of the President of the Russian Federation;
- Laws and other regulatory acts of the subjects of the Russian Federation
- Decrees of the Government of the Russian Federation and the governments of the federal subjects;
- The State (branch) Standards (GOST);
- Sanitary regulations and norms (SanPiN);
- Building norms and regulations (SNIP);
- Narrow regulations.

The basic norms and principles of the legislative regulation related to nature management and environmental protection are determined by the Constitution of the Russian Federation (1993).

The Constitution states that lands and other natural resources are used and protected as a basis of vital activities of people inhabiting the relevant territory (clause 9). Clause 42 secures for any citizen the right to favourable environment and to compensation of damage caused to his health or property as a result of environmental offence. Clause 58 binds to preserve nature and environment.

Environment bodies that are protected from pollution, depletion, degradation, damage, destruction and other negative impacts caused by the economic and other activity include:

- lands, underground resources, soils;
- atmospheric air;
- surface and subsurface waters; *and*
- forests and other flora, fauna and other organisms and their genetic fund.

The table below lists the key EHS regulation documents and summarizes its general description.

**Table 1** Legislation review

International agreements	
Stockholm Convention/Declaration of UN on the Human Environment of June 16, 1972.	<p>Stockholm Convention/Declaration of UN on the Human Environment stated that conservation and improvement of the human environment is an important issue influencing well-being and economic development of all countries in the world. Declaration stated in particular:</p> <ol style="list-style-type: none"> <li>1. The natural resources of the earth, including the air, water, land, flora and fauna and especially representative samples of natural ecosystems, must be safeguarded for the benefit of present and future generations through careful planning or management, as appropriate.</li> <li>2. The discharge of toxic substances or of other substances and the release of heat, in such quantities or concentrations as to exceed the capacity of the environment to render them harmless, must be halted in order to ensure that serious or irreversible damage is not inflicted upon ecosystems. The just struggle of the peoples of all countries against pollution should be supported.</li> <li>3. States shall take all possible steps to prevent pollution of the seas by substances that are liable to create hazards to human health, to harm living resources and marine life, to damage amenities or to interfere with other legitimate uses of the sea.</li> <li>4. The environmental policies of all States should enhance and not adversely affect the present or future development potential of developing countries, nor should they hamper the attainment of better living conditions for all, and appropriate steps should be taken by States and international organizations with a view to reaching agreement on meeting the possible national and international economic consequences resulting from the application of environmental measures and a number of other principles</li> </ol>
Rio Declaration on Environment and Development, dated June 14 <sup>th</sup> , 1992)	<p>Reaffirming the Declaration of the United Nations Conference on the Human Environment, adopted at Stockholm on 16 June 1972 Rio Declaration proclaimed 27 principles including the following: “States shall cooperate in a spirit of global partnership to conserve, protect and restore the health and integrity of the Earth's ecosystem. In view of the different contributions to global environmental degradation, States have common but differentiated responsibilities. The developed</p>



	countries acknowledge the responsibility that they bear in the international pursuit to sustainable development in view of the pressures their societies place on the global environment and of the technologies and financial resources they command”.
Convention on Long-range Transboundary Air Pollution (Geneva, November 13, 1979)	<p>Quality of atmospheric air is regulated with this Convention. Its purpose is to prevent long-range transboundary pollution of atmospheric air by discussing this matter by the Parties at early stage of taking decisions on activities. The Parties are those parties which suffer from adverse ecological impact of transboundary air pollution and the parties in the area of which the air pollution arises. The Parties develop system of measures to control quality of air, including measures against its pollution (Art. 6).</p> <p>Basic trends of environment monitoring are specified, particularly at the first stage of monitoring of sulfur dioxide, as well as necessity to exchange data on emissions within specified periods of activities, when pollutants come to the atmospheric air (Art. 9).</p>
Kyoto Protocol to United Nations Framework Convention on Climate Change (Kyoto, December 11, 1997)	<p>The Kyoto protocol specifies admissible volume of emissions of greenhouse gas for each industrial country. This volume is called as "quantity specified" for "commitment period from 2008 to 2012". The commitments belong to industrial countries listed in Annex I to Convention, and quantitative concept is specified in Annex "B" of the Protocol.</p> <p>Commitments specified in the Protocol specify emissions of six greenhouse gases from well-determined sources. Annex "A" to Kyoto Protocol specifies list of specific gases and sources of emissions taken directly from guidelines of IPCC for inventory survey of man-made emissions.</p> <p>Art. 6 of Kyoto Protocol promotes an idea to reduce emissions or to increase quantity of absorbers through programs of international investments implemented by the Parties of Annex I to Protocol by transferring relevant quotas. As per Kyoto Protocol, emission trading is a permission for two Parties of the Protocol to exchange part of their commitments on emissions, i.e. redistribute among themselves the volume of emissions which is permitted for them during some specified period.</p> <p>Apart from algorithms of quota transfer between Parties of Annex I, the Kyoto Protocol specifies “Clean Development Mechanism” (CDM), which promotes principle of activity similar to joint implementation of projects (quota exchange) as applied to the countries which are not listed in Annex I.</p>
Convention on Biological Diversity (Rio de Janeiro, June 5, 1992)	<p>Convention on Biological Diversity was signed in Rio de Janeiro on June 5, 1992. Russia ratified the Convention in February of 1995, and it came into effect for our country on 5 of April, 1995.</p> <p>Purpose of the Convention is to conserve biological diversity, stable usage of its components, and fair and equitable sharing of the benefits arising out of the genetic resources utilization including by providing the required access to the genetic resources and by duly transferring of relevant</p>

	<p>technologies taking into account all rights for these resources and technologies, as well as with the use of proper financing.</p> <p>Art. 14 of the Convention sets necessity to evaluate impact and to minimize adverse consequences.</p> <p>Each Party, as far as practicable and expedient:</p> <ul style="list-style-type: none"> <li>• introduces appropriate procedures which require environmental expertise of its proposed projects which can essentially affect the biological diversity in order to prevent or to minimize such consequences, and (when it is expedient) it enables public involvement into such procedures;</li> <li>• Takes appropriate measures to ensure proper consideration of ecological effects of its programs and strategy which are able to essentially affect the biological diversity;</li> <li>• In case of inevitable or major hazard or damage, which sources are under its jurisdiction or control, in order to provide biological diversity in the area under jurisdiction of other states or in the areas beyond national jurisdiction, it notifies (without delay) the states which can suffer from such hazard, as well as takes measures to prevent or to minimize such hazard or damage.</li> </ul>
--	---

Table 2. Review of RF Laws for environmental management and environmental protection

Regulation document	General Description
Constitution of the Russian Federation, 12.12.1993	<p>From the point of view of legal treatment of the projected activities, the most important constitutional provision is the following one: generally accepted principles and norms of international law, as well as international treaties of the Russian Federation are integrated parts of its legal system. If an international treaty of the Russian Federation specifies any other rules than those prescribed by the law, rules of international treaty shall apply (Art.15, item 4).</p> <p>Ecological safety of population is considered as a component part of national safety of the country. In the Constitution of the RF, this concept is given in four Art.s in different revisions:</p> <p>In Art. 41, protection of health and “ecological and sanitary and epidemiological welfare” are described;</p> <p>Art. 42 states that: “each one has a right .... for compensation of damage to health or property because of environmental offence”;</p> <p>Art. 69 states that the Russian Federation guarantees rights of indigenous peoples in accordance with generally accepted principles and norms of international law and international treaties of the Russian Federation;</p> <p>Art. 71 states that the Russian Federation controls principles of federal policy and federal programs in the field of ..... economical, ecological, social, cultural, and national development of the Russian Federation”;</p> <p>Art. 72 states that “ecological safety, conservation areas,”...are under joint control of the Russian Federation and territorial subjects.</p>
Federal law of 10.01.2002 N 7-FZ "On	<p>Art. 2. Laws in the field of environment protection are based on the Constitution of the Russian Federation and includes the present Federal Law, other federal laws, as well as other regulatory legal acts of the Russian Federation accepted in accordance with them, laws, and</p>

Protection of Environment"	<p>other regulatory legal acts of the Russian Federation territorial subjects.</p> <p>Art. 4. Objects of environment which are to be protected from pollution, depletion, degradation, damage, destruction, or any other negative influence of business or other activities are as follows:</p> <p>lands, subsoil, soils;</p> <p>Surface and underground waters</p> <p>Forests and other vegetation, fauna, and other organisms, and their genetical fund;</p> <p>Atmospheric air, ozone layer of atmosphere.</p> <p>Types of negative influence on the environment are as follows:</p> <p>Emissions of pollutants and other substances into atmosphere;</p> <p>Releases of pollutants, other substances, and microorganisms into surface water bodies, underground water bodies, and to water-collecting areas;</p> <p>Pollution of subsoil, soils;</p> <p>Arrangement of production and consumer waste;</p> <p>Pollution of environment by noise, heat, electromagnetic, ionizing, and other physical effects;</p> <p>Other types of negative influence on the environment.</p> <p>Effecting of payment does not release entities of business and other activity from measures to protect the environment and from compensation of damage to the environment.</p> <p>Art. 22. In order to prevent negative influence of business and other activity on the environment, standards of admissible effect on environment are specified for natural and legal persons – users of nature. These standards should provide compliance with standards of quality of environment taking into account natural features of areas and water areas.</p> <p>Entities of business or other activities are responsible for exceedance of the specified standards of admissible effect on the environment depending on harm inflicted upon the environment in accordance with the Law.</p> <p>Art. 32. Influence on the environment is evaluated regarding projected business or other activity which can effect directly or indirectly on the environment independently on legal status of economic or other entities. Arrangement, designing, construction, reconstruction, commissioning, and operation of facilities of oil and gas extraction works, facilities of processing, transportation, storage, and sales of oil, gas, and their products should be carried out in accordance with requirements of the legislation in the field of environment protection.</p> <p>Construction and operation of facilities of oil and gas extraction works, facilities of processing, transportation, storage, and sales of oil, gas, and their products are allowed in case of available projects to recover the polluted lands in the areas of temporary and (or) permanent usage of lands, positive conclusion of State expert examination of design documentation.</p>
Town-Planning Code of the Russian	<p>Art. 2. General principles of the Law on town-planning activities and regulatory legal acts issued in accordance with it require implementation of town-planning activities in compliance with the requirements of environmental protection and ecology safety and requirements for conservation of Cultural property and conservation areas.</p>

<p>Federation of 29.12.2004 No. 190-FZ</p>	<p>Art. 49. State expert examination of design documentation and results of engineering surveys. Results of engineering surveys can be sent to state expertise together with design documentation or prior to sending of design documentation to state expertise. Subject of state expertise is evaluation of compliance of design documentation with the requirements of technical regulations including sanitary and epidemiological, ecological requirements, requirements of state protection of Cultural property, requirements of fire, industrial, nuclear, and other safety, as well as results of engineering surveys and evaluation of engineering surveys results for compliance with the requirements of technical regulations. Result of State expert examination of design documentation is a conclusion on compliance (positive conclusion) or non-compliance (negative conclusion) of design documentation with the requirements of technical regulations and results of engineering surveys, as well as on compliance of results of engineering surveys with the requirements of technical regulations (if the results of engineering surveys are sent to state expertise together with design documentation).</p>
<p>Forest Code of the Russian Federation of 4.12.2006 No. 200-FZ</p>	<p>The Forest Code specifies legal basis for efficient use, preservation, protection, and regeneration of forests, as well as increasing of their ecological and resource potential.</p>
<p>Land Code of the Russian Federation of 25.10.01 No. 136-FZ</p>	<p>Art. 3. Land legislation handles relations concerning use and protection of land in the Russian Federation as living and activities base for peoples which live in some certain territory (land relations). Art. 12 describes purposes of land conservation: To prevent degradation, pollution, littering, disturbance of lands and other negative (harmful) effects of business activities; To provide improvement and restoration of the lands which were subject to degradation, pollution, littering, disturbance of lands and other negative (harmful) effects of business activities. Art. 13 specifies content of lands protection including activities to conserve the lands, protect the lands from nuclear and chemical substances pollution, from littering by production and consumer waste, mitigation of consequences of lands pollution, recultivation of lands. Art. 57. Compensation of losses in case of withdrawal of land for state or municipal needs, deterioration of land quality, temporary occupation of land plots, restriction of rights of the land plots owners, land users, landholders, and lessees of sites of land. Following losses are subject to full compensation (including loss of benefit): Losses because of withdrawal of land for state or municipal needs; Losses because of deterioration of land quality as a result of activities of other persons; Losses because of temporary occupation of land sites. The losses are compensated in accordance with “Rules of compensation for land plots owners, land users, landholders, and lessees of sites of land of losses because of withdrawal or temporary occupation of land plots, restriction of rights of the land plots owners, land users, landholders, and lessees of sites of land or because of deterioration of land quality as a</p>

	result of activities of other persons”, approved by the RF Government Ordinance of May 7, 2003 N 262.
Water Code of the Russian Federation of 3.06.06 No. 74-FZ	<p>Art. 3. Specifies basic principles of water use legislation:</p> <p>Priority of conservation of water bodies before their usage;</p> <p>Usage of water bodies should not affect the environment;</p> <p>Conservation of specially protected water bodies, which restriction or prohibition to use is specified by Federal laws;</p> <p>intended use of water bodies;</p> <p>Priority of usage of water bodies for drinking and domestic water supply if compared with other purposes of their usage. Their usage in other purposes is allowed in case of sufficient water resources only;</p> <p>Paid usage of water bodies except for cases specified in the Law of the Russian Federation;</p> <p>When specifying payment for usage of water bodies, expenses of the water users for activities related to conservation of water bodies are taking into account;</p> <p>Usage of water bodies in the area of traditional inhabitation for Indigenous Peoples of the North, Siberia, and Far East of the Russian Federation to implement traditional use of natural resources.</p>
Federal law of November, 23, 1995 N 174-FZ "On ecological expertise"	<p>The present Federal Law regulates the relationship in the field of ecological expertise, and it is intended to implement constitutional right of the Russian Federation citizens for favorable environment.</p> <p>Ecological expertise is intended to check documents and (or) documentation justifying the planned business and other activity of the examined object for compliance with ecological requirements, established technical regulations, and legislation in the field of environment protection in order to prevent affect of this activity on the environment.</p> <p>Art. 19 regulates rights of citizens and social agencies (association) in the field of ecological expertise.</p>
Federal law of 04.05.99 N 96-FZ "On Protection of Atmospheric Air"	<p>Specifies general requirements for protection of atmospheric air which are to be met during design stage, as well as in the course of operation of facilities and structures:</p> <p>standardization for emission of harmful substances and harmful physical effects;</p> <p>regulatory approval system for emissions and harmful physical effects;</p> <p>Payments for emissions;</p> <p>Check and monitoring.</p> <p>Art. 16 specifies requirements for protection of atmospheric air when designing, arranging, constructing, reconstructing, and operating the facilities of business, or other activities:</p> <p>1. While designing, arranging, constructing, reconstructing, and operating the facilities of business, or other activities, while building-up urban and other settlements, standards of quality of atmospheric air should not exceeded in accordance with ecological, sanitary-hygienic, as well as construction standards and rules as for green areas.</p> <p>2. When designing and arranging the facilities of business or other activities which affect quality of atmospheric air within urban and other settlements, as well as when building-up and reconstructing urban and other settlements, background level of pollution of atmospheric air and forecast for its quality should be taken into account.</p>



	<p>3. In order to protect atmospheric air, sanitary protection areas for companies are specified in the places of population residence. Dimensions of such sanitary protection areas are specified on the basis of calculations of harmful substances (pollutants) emissions into atmospheric air and in accordance with sanitary classification of companies.</p> <p>Arrangement and operation of business or other facilities without gas purifiers and aids to monitor emissions of harmful substances (pollutants) into atmospheric air specified by Sanitary Rules for Atmospheric Air Protection are not allowed.</p> <p>Designing, arranging, and construction of business or other facilities which operation can cause adverse climate change and change of ozone layer of the Earth, deterioration of population health, elimination of genetical fund of plants and animals, irreversible effects for people and environment are not allowed.</p>
Federal law of 24.06.98 No. 89-FZ "On production and consumer waste"	<p>The Law states right of property for waste and requirements for waste handling. It regulates monitoring, delivery of information, activities to prevent accidents, requirements for professional training of persons admitted to handle the hazardous waste, responsibility of these persons, requirements for accounting and reporting of waste handling, as well as production supervision of waste handling.</p> <p>In accordance with Art.18, in order to provide protection of environment and population health, reduction of waste amount as applied to individual businessmen and legal entities carrying out their activities in the field of waste handling, standards for generation of waste and limits for their arrangement are specified.</p> <p>Limits for SWL are specified in accordance with standards for maximum permissible harmful impacts on the environment by authorized federal bodies of executive departments or executive bodies of the Russian Federation territorial subject in the field of waste handling in accordance with their competence.</p>
Federal law of 24.04.95 No. 52-FZ "On fauna"	<p>It contains requirements concerning protection of fauna. The Law specifies procedure to protect habitat area of animals in the course of operation of industrial enterprises and structures, as well as use conditions for animal resources (licensing, payments). It establishes responsibility for law violation and damage to animals and their habitats.</p> <p>In elaboration of the Law, the Government of the Russian Federation approved "Requirements for prevention of demise of fauna within the course of industrial processes, operation of traffic arteries, pipelines, communication lines, and power lines" (1996). They regulate production operation to prevent demise of fauna which inhabit in the conditions of natural environment, including because of environmental changes and disturbance of migration path, getting into water intake structures, as well as because of impact of electromagnetic fields, noise, and vibration.</p>
Federal law of 30.03.99 No. 52-FZ "On Sanitary and Epidemiological Welfare of Population"	<p>It contains general sanitary requirements including ecological ones related to health protection from adverse impact: industrial, domestic, natural, as well as requirements for products, raw materials, water supply for population, water supply sources, atmospheric air, and waste.</p> <p>The present Federal Law regulates relations in the field of sanitary and epidemiological welfare of population control - one of key conditions for implementation of the citizens rights for protection of health and</p>

	<p>favorable environment provided under the Constitution of the Russian Federation.</p> <p>Production supervision including laboratory examinations and tests, compliance with sanitary rules and sanitary-antiepidemic (preventional) activities in the course of production, storage, transportation, and selling of products, during works execution and rendering services are carried out by individual businessmen and legal entities to provide safety and (or) harmlessness of such products, works, and services for population and life environment.</p>
<p>Federal law of 14.03.1995 № 33-FZ “Concerning Specially Protected Natural Areas”</p>	<p>Art. 2 describes categories and types of specially protected natural areas. Taking into account peculiarities of conditions of specially protected natural areas and status of environmental institutions, there are following categories of the above areas:</p> <ul style="list-style-type: none"> <li>state wildlife management areas including biospheric ones;</li> <li>national parks;</li> <li>natural parks;</li> <li>state natural wildlife reserves;</li> <li>natural sanctuaries;</li> <li>arboreta and botanical gardens;</li> <li>therapeutic regions and health resorts.</li> </ul> <p>Specially protected natural areas can be federal, regional, or local.</p> <p>State wildlife management areas are environment-oriented, research, and ecological-educating institutions having a purpose to conserve and study natural course of natural processes and phenomena, genetical fund of flora and fauna, individual species and communities of plants and animals, typical and unique ecological systems.</p> <p>Natural resources and real estate of State wildlife management areas are completely withdrawn from commerce (they can not be alienated and transferred from one person to another with the use of any other means).</p> <p>In the areas of national parks, differentiated prevention regime of special protection is established taking into account their natural, historical-cultural, and other peculiarities.</p> <p>In the areas of national parks, any activity which can affect natural complexes and flora/fauna, as well as cultural and historical objects and which contradicts purposes and tasks of national park is not allowed.</p> <p>In the national parks located in the areas of residence of indigenous population, separation of traditional extensive environmental management is allowed. At special sites, traditional business activity, handicraft and folk crafts, as well as types of usage of natural resources associated with them by agreement with directorates of national parks are allowed.</p> <p>By decision of government of the Russian Federation, construction, reconstruction, and operation of sport and recreation centers, sportive and sportive-technical structures and facilities of engineering, transportation, and social infrastructures are allowed in appropriate functional zones</p>
<p>Federal law "On guaranties for rights of indigenous peoples of the Russian Federation"</p>	<p>Art. 8 regulates rights of small peoples, associations of small peoples, and persons who belong to small peoples for protection of their original life environment, traditional prevention regime of living, husbandry, and crafts.</p>

<p>of April 30, 1999. N 82-FZ</p>	<p>In order to protect their original life environment, traditional prevention regime of living, husbandry, and crafts small peoples and unions of small peoples have the rights including:</p> <p>To use (on a gratis basis) the lands in the areas of their traditional dwelling and commercial activities of different categories which are required for their traditional husbandry and crafts and to use commonly occurring mineral resources as per procedure specified by Federal laws and laws of the Russian Federation territorial subjects;</p> <p>To participate in the supervision of usage of lands of different categories which are required for their traditional husbandry and crafts and commonly occurring mineral resources in the areas of their traditional dwelling and commercial activities;</p> <p>To participate in ecological and ethnologic expertise when developing federal and regional state programs of resource development and environment protection in the areas of traditional dwelling and commercial activities of small peoples;</p> <p>For compensation of losses incurred as a result of damage to original life environment of small peoples by commercial activities of companies of all property categories, as well as by individuals</p>
<p>Federal law “On Objects of the Cultural Heritage (Historic and Cultural Monuments) of the Peoples of the Russian Federation” of June 25, 2002 No. 73-FZ</p>	<p>As per Art.3, traces of human existence partly or completely hidden in the ground or under water including all movable items to which they pertain belong to monuments of archeology (objects of archeological heritage). Archeological excavations or evidences are principal sources of information about them.</p> <p>All facilities of archeological heritage belong to category of cultural heritage of federal significance (Art. 4) and they are considered as revealed Cultural property from the day of their detection (Art. 18).</p> <p>The Law provides for necessity to carry out activities on conservation of Cultural property including determination of admissible usage of land site, conservation archeological works, and archeological supervision of earthworks.</p> <p>On the basis of Art.36, item 4 of Federal Law, activities on conservation of archeological heritage objects are financed by the Customer of the performed works. On the basis of Art.s 46, 49 FZ, user of a land plot bears responsibility for conservation of objects of archeological heritage.</p> <p>The Laws on protection of objects of cultural conservation also take into consideration the fact that nowadays not all of archeological objects are revealed. The State protects both Cultural property included into Unified State Register and newly revealed archeological objects</p>

Besides general requirements there are numerical restrictions on pollution levels i.e. as in table 3 maximal permissible concentration for heavy metals and levels of contamination.



**Table 3** Classification of soil/ground contamination (non-organic compounds)

Element, compound	MPC	Content (mg/kg) in according to contamination level				
		1 level	2 level	3 level	4 level	5 level
Cadmium Cd		< MPC	from MPC to 3	from 3 to 5	or 5 to 20	>20
Lead Pb	6	< MPC	From MPC to 125	from 125 to 250	from 250 to 600	>600
Mercury Hg	2,1	< MPC	from MPC to 3	from 3 to 5	from 5 to 10	>10
Arsenic As	2,0	< MPC	from MPC to 20	from 20 to 30	from 30 to 50	>50
Zinc Zn	23,0	< MPC	from MPC to 500	from 500 to 1500	from 1500 to 3000	>3000
Cuprum Cu	3	< MPC	from MPC to 200	from 200 to 300	from 300 to 500	>500
Cobalt Co	5	< MPC	from MPC to 50	from 50 to 150	from 150 to 300	>300
Nickel Ni	4	< MPC	from MPC to 150	from 150 to 300	from 300 to 500	>500
Molybdenum Mo		< MPC	from MPC to 40	from 40 to 100	from 100 to 200	>200
Tin Sn	4,5	< MPC	from MPC to 20	from 20 to 50	from 50 to 300	>300
Barium Ba		< MPC	from MPC to 200	from 200 to 400	from 400 to 2000	>2000
Chrome Cr	90	< MPC	from MPC to 250	from 250 to 500	from 500 to 800	>800
Vanadium V	150	< MPC	from MPC to 225	from 225 to 300	from 300 to 350	>350
Fluor F water-soluble	10	< MPC	from MPC to 15	from 15 to 25	From 25 to 50	>50

Table 4 contains information on MPC of organic compounds and contamination levels.

**Table 4** Classification of soil/ground contamination (Organic compounds)

Element, compound	MPC	Content (mg/kg) in according to contamination level				
		1 level	2 level	3 level	4 level	5 level
Chlorinated hydrocarbons(chlorine-containing pesticides)		< MPC	from MPC to 5	from 5 to 25	from 25 to 50	>50
Chlorophenols $\text{ClC}_6\text{H}_4\text{OH}$		< MPC	From MPC to 1	from 1 to 5	from 5 to 10	>10
Phenols $\text{C}_6\text{H}_5\text{OH}$		< MPC	from MPC to 1	from 1 to 5	from 5 to 10	>10
<a href="#">polychlorbiphenyl</a>	0,06	< MPC	from MPC to 2	from 2 to 5	from 5 to 10	>10

Cyclohexane C <sub>6</sub> H <sub>12</sub>		< MPC	from MPC to 6	from 6 to 30	from 30 to 60	>60
Styrol	0,1	< MPC	from MPC to 5	from 5 to 20	from 20 to 50	>50
Oil and oil products		< MPC	from 1000 to 2000	from 2000 to 3000	from 3000 to 5000	>5000
Benz/a/pyrene C <sub>20</sub> H <sub>12</sub>	0,02	< MPC	from MPC to 0,1	from 0,1 to 0,25	from 0,25 to 0,5	>0,5
Benzol C <sub>6</sub> H <sub>6</sub>	0,3	< MPC	from MPC to 1	from 1 to 3	from 3 to 10	>10
Toluol	0,3	< MPC	from MPC to 10	from 10 to 50	from 50 to 100	>100
Xylol	0,3	< MPC	from MPC to 3	from 3 to 30	from 30 to 100	>100
Nitrates	130	< MPC	-	-	-	-
Sulphides	160	< MPC	from MPC to 180	from 180 to 250	From 250 to 380	>380

Table 5 shows limiting factor/parameter for MPC establishing

**Table 5** Limiting Nuisance Value/parameter

Name of substances	LNV
Benz/a/pyrene	General sanitary
Benzene, Benzole	Air Migration
Vanadium	General sanitary
Dimethylbenzene	Translocation
Manganese, Lead, Sulphur	General sanitary
Methyl benzene	Air Migration
Arsenic, Mercury, Superphosphate	Translocation
Nitrates	Water migration
Suppurated Hydrogen	Air Migration
Stibium, Potassium Chloride	Water migration
Chrome, Cuprum, Nickel	General sanitary
Fluor, Zinc	Translocation

Table 6 provides an example of climate characteristics.

**Table 6** Climate Characteristics for N region

Characteristics		Value
Ambient air temperature, °C	Average annual	3.6
	Absolute minimal	-45
	Absolute maximal	34
	Average temperature of the warmest month	22.7
	Average temperature of the coldest month	-6.8

Characteristics		Value
Duration of the period with average daily temperature $\leq 8$ degrees, days		221
Precipitation amount, mm/year	April-October	424
	November-March	176
Relative average monthly humidity at 3 p.m., %	of the warmest month	76
	of the coldest month	85
Maximal value of average wind velocity in January, m/s		4.6
Minimal value of average wind velocity in July, m/s		4

Source: Climatic characteristics are given based on SNiP 23-01-99 "Construction Climatology".

### Validity period of EBA results

One should take into account limitations of materials validity established in the Code of rules SP 47.13330.2016 "Engineering surveys for construction. The main provisions of the "Updated version of SNiP 11-02-96" obtained as a result of engineering surveys.

See table 7. the limitation periods for the use of some EBA materials are presented.

**Table 7. The possibility of using the results of engineering-geological surveys of previous years**

Type of materials	Validity period
engineering-topographic plans	as a rule, no more than two years when confirming the relevance of the information displayed on them*.
materials of engineering-hydrometeorological surveys in the study of the hydrological regime of water bodies	it should not exceed two years, the meteorological regime of the territory-five years (from the end of engineering and hydrometeorological surveys to the beginning of design).
materials of observations on posts and stations of the state network	be used without restriction of period of limitation and the Supplement for each of the last two years for hydrological observations and for each of the last five years for meteorological observations. **

Source: SP 47.13330.2016 " Engineering surveys for construction. Fundamentals»

\* - in areas where changes in the situation and terrain are more than 35%, topographic survey should be performed again. Topographical engineering plans, based on the survey materials at a snow cover height of more than 20 cm, are subject to renewal in a favorable period.

\*\* - In cases when during the specified periods extreme values of hydrometeorological characteristics were recorded, the materials of observations for the period of their manifestation shall be obtained.

### Engineering-geological surveys

When performing engineering-geological surveys allowed the use of the results of engineering-geological surveys of previous years, taking into account the limitation period of materials (the period from the end of the survey to the beginning of the design), the Statute of limitations are presented in table 8 below.

Table 8. Limitation periods for the results of engineering-geological surveys of previous years

Characteristics of engineering - geological conditions	Validity period of used results, years	
	Green sites (no construction activities performed)	Brown sites (construction activities performed)
Geological structure	Without limitations	Without limitations
Hydrogeological conditions	5	2
Physic-chemical properties of soils, chemical content of ground waters	5	2
Physical and mechanical properties of permafrost soils	5	2
Geological and engineering-geological processes	5	2
Geocryological and engineering-geocryological processes	5	2
Seismic and seismotectonic conditions	Without limitations*	Without limitations*

Source: SP 47.13330.2016 " Engineering surveys for construction. Fundamentals»

\* Except in cases when the normative seismicity of the territory has changed or new data on seismic and seismotectonic conditions of the work area have been obtained, which have priority in relation to the OSR maps<sup>9</sup>

The possibility of using the results of engineering-geological surveys of previous years should be established taking into account the changes in engineering-geological conditions that occurred during this period.

Identification of these changes should be carried out according to the results of reconnaissance survey of the study area, which is performed before the development of the final program of engineering surveys.

#### Engineering and environmental surveys

When performing engineering and environmental surveys, it is allowed to use materials of engineering and environmental surveys of previous years, taking into account the Statute of limitations of materials (the period from the end of the survey to the beginning of design) in accordance with table 9. following.

Table 9. Statute of limitations for the results of environmental engineering surveys of previous years

Characteristics of engineering - geological conditions	Validity period of used results, years	
	Green sites (no construction activities performed)	Brown sites (construction activities performed)
Soil conditions	5	2
Geobotanic conditions	2	2
Data about the animal world	2	2
Data on the level of pollution of		

<sup>9</sup> General seismic regioning

environmental components:		
- atmospheric air	3	2
- soils	5	3
- superficial water	3	2
- subterranean water	3	2
- bottom sediments	3	2
Data on pollution sources	5	3
Hazardous natural and natural-anthropogenic processes	10	5
Data about the radiation environment, medical-biological and sanitary-and-epidemiological information	3	2
Data of the account of number of objects of fauna carried to objects of hunting and not carried to the animals from Red books	1	1
Information on the anthropogenic load obtained in the archives of territorial and local Executive authorities for construction and architecture	3	2

Source: SP 47.13330.2016 " Engineering surveys for construction. Fundamentals»

Note-it is allowed to specify in terms of changing the Statute of limitations of any materials with appropriate justification in the program of environmental engineering surveys.

If the survey results of previous years were used to Supplement the results of ongoing engineering and environmental studies, the volumes allowed to reduce in the justification in the program of studies.

### Sample EBA table of content report

#### Introduction

1. Geographic location of the work area
2. Natural environment condition of the surveyed area
  - 2.1. Climatic characteristic of the region
    - 2.1.1. Radiation conditions
    - 2.1.2. Thermal regime
    - 2.1.3. Moisture conditions
    - 2.1.4. Snow cover parameters
    - 2.1.5. Wind conditions
    - 2.1.6. Hazardous atmospheric phenomena
    - 2.1.7. Background air pollutants concentration
  - 2.2. Geological-geomorphologic conditions

- 
- 2.2.1. Brief description of geological structure
  - 2.2.2. Relief
  - 2.2.3. Geocryology
  - 2.2.4. Hydrogeological conditions
  - 2.3. Hydrological characteristics
    - 2.3.1. Hydrographic network
    - 2.3.2. Hydrological regime
    - 2.3.3. River and lake ice regime
    - 2.3.4. Turbidity, river bed processes and river sediments
    - 2.3.5. Hydrochemical parameters of surface water
  - 2.4. Soils
    - 2.4.1. General features of the territory
    - 2.4.2. Soil types parameters
  - 2.5. Landscapes
  - 2.6. Vegetation
    - 2.6.1. General characteristic of site vegetation characteristics
    - 2.6.2. Anthropogenic transformation and vulnerability of vegetation
  - 2.7. Fauna
    - 2.7.1. Theriofauna
    - 2.7.2. Avifauna
    - 2.7.3. Fish fauna
    - 2.7.4. Invertebrate hydrobionts and feeding for fishes
    - 2.7.5. Fauna associations
    - 2.7.6. Protected species of fauna
  - 3. Ecological state of natural environments
    - 3.1. Atmospheric air pollution
    - 3.2. Soil properties and contamination
-

- 3.2.1. Soil contamination
- 3.2.2. Physical, chemical and agrochemical properties of soils
- 3.3. State of ground waters and soils of aeration zone
  - 3.3.1. Groundwater
  - 3.3.2. Soils of aeration zone
- 3.4. Contamination of surface waters and bottom sediments
  - 3.4.1. Contamination of surface waters
  - 3.4.2. Contamination of bottom sediments
- 3.5. Radioecological investigations
- 3.6. Sanitary and epidemiological investigations
  - 3.6.1. Sanitary and epidemiological assessment of soils
  - 3.6.2. Sanitary and epidemiological assessment of waters
- 4. Social and economic assessment
  - 4.1. Demographic situation
  - 4.2. Economic activity
  - 4.3. Social services
- 5. Environmental restrictions and risks
  - 5.1. Specially protected natural areas located within the territory of the field
  - 5.2. Historical and cultural heritage sites
  - 5.3. Water protection zones and coastal shelter belts. Protection of spawning grounds
  - 5.4. Hazardous exogenic processes
  - 5.5. Rare and protected species of flora and fauna

## References

## Annexes

Annex 1. Environmental conditions and information on background contamination of atmosphere

Annex 2. Letter from State water basin management board about water protection zones

Annex 3. Letters about specially protected natural areas

---

Annex 4. Fact sheet about cultural heritage sites

Annex 5. Thematic maps



## 2. MANAGEMENT OF ENVIRONMENTAL IMPACT ASSESSMENT

Environmental impact assessment is a process that facilitates the adoption of environmentally – oriented management decisions on the implementation of the planned economic and other activities through the identification of possible adverse effects, environmental impact assessment, public opinion, the development of measures to reduce and prevent impacts. EIA is a document that comprehensively describes all types of impact of an enterprise, an economic entity on the environment.

The section “List of environmental protection measures” including an Environmental Impact Assessment (PMOOS-OVOS) is the document containing the information on the EIA of certain project.

### **The purpose (aim) of the EIA**

to prevent or mitigate the impact of the proposed activity on the environment and related social, economic, environmental and other consequences.

As a result of the development of the EIA project, information will be prepared on the scale and nature of the environmental impact of the proposed economic activity, the assessment of environmental and other impacts, their significance, and the possibility of reducing them.

### **The basic principles of an EIA<sup>10</sup>**

- The principle of presumption of potential environmental hazard of any proposed economic or other activity.
- The principle of mandatory state environmental impact assessment. The EIA materials of the planned economic and other activities, which are the object of environmental expertise, are part of the documentation submitted for examination.
- The principle of prevention. Prevention (prevention) of possible adverse effects on the environment and related social, economic and other consequences in the event of the implementation of the planned economic and other activities.
- The principle of variation. Evaluation of alternative options for construction or economic activity.
- Principle of responsibility. The customer (initiator) of the activity is responsible for the consequences of the implementation of design decisions. The customer (contractor) identifies, analyzes and takes into account the environmental and other related consequences of all considered alternative options to achieve the goal of the planned economic and other activities, as well as the "zero option" (abandonment of activities).
- Principle of publicity. Participation of public organizations (associations), taking into account public opinion in the environmental impact assessment. Ensuring public participation in the preparation and discussion of materials on environmental impact assessment of the planned economic and other activities that are subject to environmental impact assessment as an integral part of the environmental impact assessment process.
- The principle of scientific validity, objectivity and legality of conclusions of ecological examination. Materials for environmental impact assessment should be scientifically justified, reliable and reflect the results of studies carried out taking into account the relationship of various environmental, as well as social and economic factors.

<sup>10</sup> For more details in Russian see order of Minpriroda dated December 1, 2020 N 999 On approval of requirements for environmental impact assessment materials <https://docs.cntd.ru/document/573339130?marker=65601Q>

- The principle of reliability and completeness of information submitted for environmental assessment. The customer is obliged to provide all participants in the environmental impact assessment process with the opportunity to obtain complete and accurate information in a timely manner.
- The principle of monitoring the impact of the project on the environment. The results of the environmental impact assessment serve as the basis for monitoring, post-project analysis and environmental control over the implementation of the planned economic and other activities.
- The principle of accounting transboundary impact. In the event that the proposed economic and other activities may have a transboundary impact, studies and the preparation of environmental impact assessment materials shall be carried out taking into account the UNECE Convention on environmental impact assessment in a transboundary context.

### The main tasks of the EIA

- Identification and analysis of all possible impacts of the planned activity on the environment of the project implementation area of the planned activity.
- Forecast and assessment of possible changes in the environment that may occur as a result of negative impacts as a result of the planned activities.
- Prediction and sequencing of the significance of environmental and related social, economic and other impacts.
- Accounting in the prepared economic decisions of possible consequences of their implementation.

The work is aimed at assessing the environmental implications of the projected economic activities, so as to prevent or mitigate the impact thereof on the environment, as well as the social, economic and other consequences associated therewith.

Section “List of environmental protection measures” including an Environmental Impact Assessment (PMOOS-OVOS) is drawn up taking into account requirements of international standards (ratified by the Russian Federation), acts of law, and regulatory and procedural documents of the Russian Federation (as amended).

List of regulatory and procedural documents used to develop the section PMOOS-OVOS is given below in table 2.1.

Table 2.1. List of legislation related to EIA

<b>EIA and Environmental Expert Review</b>	
On environmental expert review, No. 174-FZ, dated 23 November 1995	Law establishes two types of environmental expert review: state environmental expert review and public environmental expert review. Law regulates procedure of State Environmental Expert Review (SEER). The Law determines SEER as mandatory for all types of pre-project and project documents, regardless of financial sources of the proposed activity, and of its initiator.
On structure of project documentation sections and requirements to their contents Decree of RF Government # 80 of 16 February 2008	Provides requirements to EIA content. 25. Section 8 "List of environmental protection measures" shall contain: <b>in the text part</b> a) the results of the evaluation of the impact of the facility on the environment;

	<p>b) the list of actions for prevention and (or) reduction of possible negative impact of the planned economic activity on environment and rational use of natural resources for the period of construction and operation of the capital construction object including:</p> <ul style="list-style-type: none"> <li>✓ results of calculations of surface concentrations of pollutants, analysis and proposals for maximum permissible and temporarily agreed emissions;</li> <li>✓ substantiation of decisions on wastewater treatment and disposal of neutralized elements, on prevention of emergency wastewater discharges;</li> <li>✓ measures for the protection of atmospheric air;</li> <li>✓ measures for circulating water supply - for industrial facilities;</li> <li>✓ measures for the protection and rational use of land resources and soil cover, including measures for the reclamation of disturbed or contaminated land and soil cover;</li> <li>✓ measures for collection, use, disposal, transportation and disposal of hazardous waste;</li> <li>✓ measures for the protection of mineral resources - for industrial facilities;</li> <li>✓ measures for the protection of objects of flora and fauna and their habitat (in the presence of objects of flora and fauna listed in the Red book of the Russian Federation and the red book of the subjects of the Russian Federation, separately indicate measures for the protection of such objects);</li> <li>✓ measures to minimize the occurrence of possible emergencies at the capital construction site and the consequences of their impact on the ecosystem of the region;</li> <li>✓ measures, technical solutions and facilities to ensure the rational use and protection of water bodies, as well as the conservation of aquatic biological resources (including the prevention of fish and other aquatic biological resources in water intake facilities) and their habitats, including the conditions of their reproduction, feeding, migration routes (if necessary);</li> <li>✓ program of industrial environmental control (monitoring) of the nature of changes in all components of the ecosystem in the construction and operation of the facility, as well as accidents;</li> </ul> <p>c) the list and calculation of costs for the implementation of environmental protection measures and compensation payments;</p> <p><b>in the graphic part</b></p> <p>d) the situational plan (map-scheme) of the area of construction with indication on it of borders of the parcel of land provided for placement of capital construction object, borders of the sanitary protection zone, the residential territory, recreational zones, water protection zones, zones of protection of sources of</p>
--	---

	<p>drinking water supply, habitats of the animals and plants brought in the Red book of the Russian Federation and red books of subjects of the Russian Federation, and also locations of settlement points;</p> <p>e) the situational plan (map-scheme) of the area of construction with indication of borders of the parcel of land provided for placement of capital construction object, the arrangement of sources of emissions of pollutants into the atmosphere and devices for cleaning of these emissions;</p> <p>(f) schematic maps and summary tables of calculations of atmospheric pollution under adverse weather conditions and emissions by substances and combinations of substances with cumulative harmful effects for industrial facilities;</p> <p>g) the situational plan (map-scheme) of the area with indication of borders of the parcel of land provided for placement of capital construction object, with indication of control points, posts, wells and other objects providing sampling of water from surface water objects, and also underground waters - for objects of production appointment.</p>
Order of Minpriroda (Russian Ministry of environment) dated December 1, 2020 N 999 On approval of requirements for environmental impact assessment materials	<p>According to the Decree the development of Environmental Impact Assessment must cover all stages of the design documentation preparation and substantiate the planned industrial (or other) activities.</p> <p>In accordance with the Regulation on Environmental Impact Assessment, the following phases of environmental assessment have been stipulated:</p> <ol style="list-style-type: none"> <li>1 Notification, preliminary assessment and preparation of terms of reference of an EIA</li> <li>2 Investigations required for an EIA and preparation of preliminary draft EIA documentation</li> <li>3 Preparation of the final EIA documentation.</li> </ol> <p>The Decree states the minimal requirements on EIA development (including mandatory public involvement in making-decision process, considering of alternative options, development of environmental monitoring program)</p>
Guidelines on Environmental Protection Section development to SNiP Norm 11-01-95	<p>The guidelines set out the instructions relating to the preparation of information on environmental protection. As an integral part of the design documentation, the Environmental Protection section should provide a set of proposals aimed at sound and consistent use of natural resources in the course of construction, as well as technical solutions for preventing adverse environmental impact of the planned facilities.</p>
Manual on development of the section “Environmental Impact Assessment” when substantiation of investment for SP 11-101-95	<p>The Manual sets forth the recommendations on EIA development on substantiation of investment stage.</p>
<b>General issues</b>	

On Environmental Protection, No. 7-FZ, dated 10 January 2002	<p>This law is a cornerstone of the environmental legislation. In accordance with the Law “On Environmental Protection” the below nature bodies are liable to protection:</p> <ul style="list-style-type: none"> <li>• Lands, mineral resources, soils;</li> <li>• Surface and underground waters;</li> <li>• Forests and other vegetation, animals and other organisms and their gene pool;</li> <li>• Atmospheric air.</li> </ul> <p>This law sets forth constitutional Order 372, introduces in practice a vast range of environmental actions and establishes requirements on the environment quality standardization by:</p> <ul style="list-style-type: none"> <li>• Sanitary-hygienic norms (maximum permissible concentrations (MPE) of pollutants in the atmospheric air and in water bodies and physical impacts); sanitary protection zones and others;</li> <li>• Norms of permissible emissions and discharges (MPE/MPD) set up for stationary and fugitive sources of impact, as well as norms for generation and disposal of industrial and domestic wastes and etc.</li> </ul>
On Sanitary and Epidemiological Well-being of Population, No. 65-FZ, dated 30 March 1999	<p>The law describes general requirements to ensuring hygienic and epidemiological well-being of the population, including environmental protection and requirements to waste collection, storage, transportation, disposal and utilization; water bodies protection, establishment of water protection zones along riversides and coasts, MPC of harmful substances in natural water bodies, air quality control in residential areas, working conditions, physical impacts of the process operations on personnel, work with harmful substances, medical examination of personnel.</p>
<b>Ambient Air</b>	
On atmospheric air protection, No. 96 – FZ, dated 4 May 1999	<p>The Law establishes general principles of atmospheric air protection. The law defines the rights of the federal and regional executive bodies to establish Maximum permissible emissions (MPE) or tentatively agreed emissions (TAE), issue permits for air emissions, approve plans for air emission reduction, etc., perform inspections and impose fines and other penalties (including the right to stop the operations). Also the law declares the necessity of the sanitary-protection zones.</p>
Russian Federation Government Order “On Harmful (Polluting) Substances Air Emission and Harmful Physical Impact Standards”, No. 183, dated 02 March 2003	<p>The Order defines the procedure of development and approval of standards for harmful substances air emissions and harmful physical impacts.</p>
Hygienic Standards GN 2.1.6.1338-03 “Maximum Permissible Concentrations (MPC) of Air Pollutants in Populated Areas”	<p>The Standards define Maximum permissible concentrations (MPC) of harmful substances in atmospheric air of urban settlements.</p> <p>Total number of substances with fixed MPC is 611 and there are 45 substances prohibited to emit.</p>

	MPC are used for maximum permissible emissions calculations. Calculations are based on dispersion prevention regimeling.
SanPiN 2.2.1/2.1.1.1200-03. Sanitary protection zone and sanitary classification of enterprises, facilities and other objects	This SanPiN gives the classification of enterprises belonging to various industries and specifies SPZ requirements for each type respectively.
SanPiN 2.1.6.1032-01. Hygienic requirements for air quality of populated area	This SanPiN specifies the requirements to design and arrangement of sanitary protection zone, hygienic requirements to air quality at the boundary of SPZ (pollutants concentrations, odors, noise, etc.) for new facilities. As for existing plants SanPiN establishes the following requirements: to develop MPC for pollutants in SPZ, to develop and fulfill air emission reduction plans, to provide air quality control in SPZ, to have all innovations, reconstruction etc. approved by the relevant sanitary inspection, to inform the relevant authorities about MPC/MPE exceedances, etc.
<b>Water resources</b>	
Water code, No. 74-FZ, dated 03.12.2006	The Code formulates general requirements to water bodies protection and use, responsibilities and rights of federal and regional authorities regarding water quality assessment and control as well as establishing limits of water consumption and wastewater discharge, water protection zones, etc.
On internal sea water, territorial sea and the adjoining zone, No 155-FZ, dated 31 July 1998	The Law states the legal regime of internal sea water and territorial sea. Also the law specifies the main principles of the activity (e.g. offshore scientific studies, installation of man-made islands, laying of offshore pipelines and cables) within internal sea water and territorial sea.
SanPiN 2.1.4.1110-02. Sanitary Protection Zones of Drinking Water Supply Sources	This SanPiN describes the requirements to establishment and arrangement of water wellhead protection zones.
GN 2.1.5.1315-03 Maximum permissible concentrations (MPC) of chemical substances in the water of the water bodies of sanitary and drinking and cultural and domestic water use”	Define Maximum permissible concentrations of chemical substances in the water of the water bodies of sanitary and drinking and cultural and domestic water use.
List of MPC for water bodies valuable for fishery (Order of the State Committee for Fishery № 96 of April 28, 1999)	Provides the list of maximal permissible concentrations of pollutants for the water bodies
<b>Flora and Fauna</b>	
Forest code, No. 200-FZ, dated 04.12.2006	The Forestry Code of the Russian Federation establishes legal bases for rational use, protection and reproduction of forests, increase of their environmental and resource value



On fauna, No. 52-FZ, dated 24 April 1995	The law regulates relations in the field of protection, use and conservation of fauna
On fishery and aquatic biological resources preservation, No. 166-FZ, dated 20 December 2004	The law formulates requirements to aquatic biological resources protection. Also the law specifies the order of getting permits for fishery.
On the Red Book of the Russian Federation, Decree of the Government of the Russian Federation No. 158, dated 19 February 1996	The Decree states that species of fauna and flora included in the Red Book of the Russian Federation are subject to special protection.
<b>Specially protected areas</b>	
On specially protected nature areas, No. 33-FZ, dated 14 March 1995	The law regulates relations in the field of organization, protection and use of specially protected natural areas with a view of conservation of unique and typical natural habitats and objects, remarkable natural objects, flora and fauna objects, their genetic fund, study of natural processes in the biosphere and monitoring for changes of its state, and environmental education of the population. The law also defines categories and kinds of specially protected natural objects.
On cultural heritage (historical and cultural monuments) of RF population, No. 73-FZ, dated 25 June 2002	The Law regulates relations in the sphere of conservation, use and state protection of cultural heritage. According to the law any construction work is prohibited within cultural heritage territory. The main principles of activity in the area of cultural heritage are defined by the law in Art. 35.
On territories for traditional use of natural resources by indigenous ethnic minorities of the North, Siberia and Far East of the Russian Federation, No.49-FZ, dated 07 May 2001	The Law formulates the requirements to the activity within the territories for traditional use of natural resources by indigenous people of the North, Siberia and Far East of the Russian Federation.
<b>Wastes</b>	
On Production and Consumption Wastes, No.89-FZ dated 24 June 1998	This law is the basic document on waste handling. The law describes general requirements on waste generation, collection, storage, transportation, disposal and minimization. Also this law sets the requirements on licensing of hazardous wastes handling.
SN 2.1.7.1386-03 “Sanitary rules for determination of hazardous class of production and consumption toxic wastes”	This classification system is based on a set of factors, which take into account both the impact of wastes on the environment, and the toxic, or related hazardous parameters, which are very significant for assessment of potential harmful impacts on human health (both acute and chronic health risks). Industrial materials and wastes are divided into four classes of hazard (toxicity)
<b>Industrial safety</b>	
"On industrial safety of hazardous production/industrial	It's a major basic law regulating industrial safety. The law determines legal, economical and social principles and basics for safe operation on hazardous industrial objects. It's aimed at

objects” N 116-FZ dated July 21, 1997	emergency situations and accidents prevention, provision of due preparedness of organizations/companies operating hazardous industrial objects/facilities to localize and liquidate accident consequences. This law is obligatory for any organization/company operating in Russia.
Rules of Registration of Objects/Facilities in the Government Registry of Hazardous Production Objects approved by Gov Decree 1371, On Registration (with amendments of February 1, 2005)	Rules establish a procedure for registration of hazardous objects/facilities operated in the Russian Federation. Such facilities must be registered in the State Register of hazardous objects. This procedure is obligatory for any organization/company operating hazardous facilities in Russia.
<b>Land use</b>	
Land code, No. 136-FZ, dated 25 October 2001	The RF Land Code defines requirements for land protection including those for prevention of chemical contamination.
On subsoil resources, No. 2395-1, dated 21 February 1992	The law defines the key requirements for rational use and protection of subsoil resources. Particularly, it is aimed to “prevent accumulation of industrial and domestic wastes in watershed areas and ground water basins used for potable or process water supply needs”.
On Land Management, No. 78-FZ, dated 18 June 2001	The law regulates land use to provide its rational use and conservation. The main principles of land use documentation development and approval are established.
On reclassification of land from one category to another, No. 172-FZ, dated 21 December 2004	According to the law in case of land reclassification an application should be developed and submitted for approval by the authority. The main requirements on application development and order of its approval are specified by the law.
Sanitary-epidemiological requirements to soil quality, SanPiN 2.1.7.1287-03, dated 17 March 2003	Sanitary rules establish requirements to soil quality of territories used for residential and agricultural purposes.
SanPin 2.1.7.1287-03 – “On sanitary – epidemiologic quality requirements of soil” (including changes of 25th April 2007) (approved by Decree of Chief State Medical Officer of 17 April 2003 # 53)	The document contains sanitary – epidemiologic quality requirements of soil of conglomerates, especially for significant territories (zones of high risk) children and educational institutions, sport and play grounds, recreation areas, water bodies protective zones, coastal/literal zones, SPZ. According to the hazard level soil can be divided on: clean, allowed, prevention regimerately hazardous, hazardous, extremely hazardous. According to the document soil sampling should be performed layer wise at depth 0-0,2 m, 0.2-1,0 m, 1,0 –2,0 m from the topsoil and deeper not less than each meter depending on the depth of building foundation, communications and other conditions
Sanitary rules SR 2.1.5.1059-01 “Hygienic requirements for protection of underground	The SR define hygienic requirements on prevention of negative influence of economic and other activities on underground waters if such activities can lead to decrease of use of such water



waters from pollution” (approved by Decree of Chief State Medical Officer of 21 July 2001)	for drinking, households and medical aims, as well if it may lead negative influence on human health. The document defines system of sanitary protection of underground waters (hygienic requirements to waters, zones of sanitary protection etc), requirements for control on protection of underground waters.
Hygienic normative HN 2.1.7.2041-06 – “On maximal premised concentrations of chemical compounds in soil” (approved by Decree of Chief State Medical Officer of 19 January 2006 # 19)	The normative is valid for whole RF territory for al types of land use. The normative are valid for settlement lands. MPCs of pollutants in soil are given in the normative. For more detailed MPC description for selected substances see tables 2 and 3 below.
Hygienic normative GN 1.1.725-98 “List of chemical compounds, products, industrial processes, natural and domestic factors which are carcinogenic for humans” (approved by Decree of Chief State Medical Officer of 21 July 2001)	The normative describes chemical compounds, products, industrial processes, natural and domestic factors which are carcinogenic for humans, giving MPS for substances.
Methodology of harm to ground water calculation (approve by State Ecology committee of RF, MNR of RF, MinFin RF of 11 February 1998) including changes of 31 May 1999 and 1 June 1999	The methodology is developed for cases of environmental violations and emergency at transport and enterprises when polluted ground waters are affecting other components of environment (soil, flora and fauna, sea waters, surface waters).
Methodology of hygienic evaluation of soil in residential areas of 7 February 1999 # MG 2.1.7.730-99	This methodology is a basis for state sanitary – epidemiologic supervision of settlement lands. Defines principles of soil sampling for sanitary estimation of territory, methodology of summary pollution index definition. Concentration of components which bring soil into waste of certain type of hazard
Procedure of damage calculation from soil pollution by chemical substances issued by Ministry of natural resources and ecology of 27 December 1993 # 04-25/61- 5678	The procedure describes order and manner of damage calculation in case of soil pollution by chemical compounds, including case of soil pollution by unorganized industrial waste storages, municipal waste storages and other wastes located at all types of land not regarding location and land property form. Indicators of pollution level are provided in the document. For more detailed description for selected substances see tables below.

Source: Collected by authors

### Participants and executors of the EIA

The EIA procedure involves representatives of different parties who perform certain functions depending on their status. There are participants and performers.

The participants include the initiators of the planned activities and the authority, as well as the public.

Initiators of the planned activity - legal entities or individuals who have declared their intention to conduct economic activities, as well as investing in the preparation and implementation of this activity.

A government is an Executive, legislative or representative body. By issuing a permit to the initiator to carry out economic activities, the authorities assume responsibility for the fact that the activities planned by the initiator will not entail unacceptable consequences for the society. In this regard, the authorities perform the following functions:

- make the decision on consent (or refusal) on preparation by the customer of offers on justification of the planned activity;
- determine the boundaries of the affected area, in the territories of which research should be conducted in connection with the possible impact of the future object on the environment;
- establish points and time of public hearings, ways of informing the public and local population about the planned activity;
- inform the population about the decision;
- make the decision on issue of the license for complex nature management.

The public is a part of society that actively participates in the life of this society and expresses the opinion of this part of society. These may be local residents living near the construction site, citizens, etc. public hearings of EIA with their participation should be mandatory.

The executors include the customer and the developer of solutions for the project.

Customer-on behalf of the initiator provides all the necessary preparation for the implementation of the planned activities.

### **Main functions of the customer**

- preparation of documents within the EIA and timely submission of the package for approval to the relevant authorities;
- organization of the necessary research and studies;
- approval of the project of economic or other activities;
- organization of internal control over the implementation of measures and measures that ensure compliance with environmental requirements and conditions in the implementation of the economic project;
- implementation of measures to identify and take into account the opinion of the population of the affected area on environmental changes resulting from the implementation of the economic project (economic activities).

Developer of solutions for the object-a third-party design or research organization that develops solutions for the object, as well as prepares supporting documentation for the implementation of the planned economic or other activities.

### **The functions of the developer solutions on the object**

- preparation of application and other documents within the EIA, which are submitted for consideration to the authorities;

- development of fundamental decisions on the object, the definition of General characteristics and expected environmental impacts, the formation and analysis of reasonable alternatives and options to achieve the goals of the initiator;
- analysis of the collected initial information on the proposed location of the future facility, assessment of the overall cumulative impact of the planned activities, taking into account existing and planned to create economic and other facilities in the affected area;
- correction of engineering, technical and other decisions on the object to ensure compliance with the agreed environmental conditions and prevent environmental and related social, economic and other consequences identified in the EIA process;
- preparation of a proposal for the organization of monitoring of environmental changes in the implementation of the economic project.

### **The responsibility of the participants of the EIA**

#### ***The customer is responsible for:***

- completeness of initial documentation;
- reliability and completeness of the initial data;
- accounting and presentation of the EIA results as part of the pre-project and project documentation to the state control bodies;
- environmental and related consequences of the implementation of the project plan (in the construction of new, reconstruction, expansion, technical re-equipment, operation and liquidation of economic facilities and complexes).

***The developer (contractor)*** of pre-project and project documentation is responsible to the customer for the accuracy, completeness and quality of the results of the EIA based on the initial data.

***Organizations and specialists*** (subcontractors) involved in the EIA are responsible to the developer (contractor) for the accuracy, completeness and quality of the information provided.

**State control bodies** are responsible to state authorities and management for timely, qualified and objective consideration of pre-project and project documentation containing the results of the EIA.

### **The EIA procedure**

The process of developing an EIA project consists of several stages, for which a certain set of documents is required. At the end of the process, a document should be submitted, which is based on the results of the past operation.

#### ***Stage 1. Notice of intent***

The project owner sends a notification to the state authorities and management, which describes the planned economic activity, its objectives and conditions of implementation, options for the implementation of activities, etc. at the same stage, the public is notified and the terms of reference for the EIA project are drawn up.

The notification is submitted for the purpose of obtaining consent for further preparation and consideration of proposals for the development of the planned activity at possible sites of its implementation

Thus, during the first stage the customer:

- prepare and submit to the authorities the relevant documentation containing a General description of the proposed activity; the purpose of its implementation; the possible alternatives; a description of the conditions of its implementation; other information prescribed by the applicable regulations of the;
- inform the public in accordance with Order 999<sup>11</sup>;
- conducts a preliminary assessment of the main Order 999 and documents its results;
- conducts a preliminary consultation to determine the participants in the process of assessing the impact on the environment, including the interested public.

During the preliminary environmental impact assessment, the customer collects and documents the information:

- on the planned economic and other activities, including the purpose of its implementation, possible alternatives, terms of implementation and the proposed location, the affected administrative territories, the possibility of transboundary impact, compliance with territorial and sectoral plans and programs;
- the state of the environment likely to be affected and its most vulnerable components;
- on possible significant environmental impacts (land requirements, waste, loads on transport and other infrastructure, sources of emissions and discharges) and measures to reduce or prevent these impacts.

Based on the results of the preliminary impact assessment, the customer shall draw up the EIA specification (hereinafter referred to as the ToR<sup>12</sup>), which contains::

- name and address of the customer (contractor);
- timing of environmental impact assessment;
- basic methods of environmental impact assessment, including a plan for public consultation;
- the main objectives of the environmental impact assessment;
- the expected composition and content of materials for environmental impact assessment.

When drawing up the ToR, the customer takes into account the requirements of specially authorized bodies for environmental protection, as well as the opinions of other participants in the environmental impact assessment process. ToR is sent to the participants of the process of assessing the impact on the environment according to their needs and available to the public during the entire time of the evaluation of the impact on the environment.

ToR for the impact assessment on the environment is part of the materials for the assessment of the impact on the environment.

---

<sup>11</sup> Order of the Ministry of Natural Resources and Ecology of the Russian Federation No. 999 dated December 1, 2020 "On Approval of Requirements for Environmental Impact Assessment Materials" <https://base.garant.ru/400665628/?ysclid=15tk8dkb8q858938992>

<sup>12</sup> Terms of reference

---

**Stage 2. Research and preparation of a preliminary version of the EIA materials**

The customer (contractor) is conducting research to assess the impact on the environment in accordance with the statement of work, consideration of alternatives implementation, activity goals, ways to achieve them, and prepared a preliminary variant of materials on environmental impact assessment on the environment.

Studies to assess the environmental impact of the proposed economic and other activities include the following (Order 999):

- determination of the characteristics of the planned economic and other activities and possible alternatives (including abandonment);
- analysis of the state of the territory, which may be affected by the planned economic and other activities (the state of the natural environment, the presence and nature of anthropogenic load, etc.);
- identification of possible impacts of the planned economic and other activities on the environment, taking into account the alternatives;
- assessment of environmental impacts of the planned economic and other activities (probability of risk, degree, nature, scale, area of distribution, as well as forecasting of environmental and related social and economic consequences);
- identification of measures to reduce, mitigate or prevent negative impacts, assessment of their effectiveness and feasibility;
- assessment of the significance of residual environmental impacts and their consequences;
- comparison of the expected environmental and related socio-economic consequences of the alternatives under consideration, including the option of abandonment of activities, and justification of the option proposed for implementation;
- development of proposals for the program of environmental monitoring and control at all stages of the planned economic and other activities;
- development of recommendations for post-project analysis of the implementation of the planned economic and other activities;
- preparation of a preliminary version of the materials on environmental impact assessment of the planned economic and other activities (including a summary for non-specialists)

Public hearings results are prepared in accordance 999 Order of the ministry of environment.

**Stage 3. Preparation of the final version of the EIA materials.**

The final version of the EIA materials is prepared on the basis of the preliminary version of the materials, taking into account the comments, suggestions and information received from the participants of the EIA process at the stage of discussion.

If in connection with the received comments and proposals it is necessary to make changes, then the project is adjusted.

Information should be included in the final version of the environmental impact assessment materials:

- about the account of the arrived remarks and offers;

---

- minutes of public hearings (if any).

The final version of the EIA materials is approved by the customer, submitted for use in the preparation of supporting documentation and in its composition is submitted to the state ecological expertise, as well as to the public ecological expertise (if any).

Public participation in EIA can be carried out:

- at the stage of submission of initial information;
- at the stage of EIA and preparation of supporting documentation.

For the planned investment activity the customer carries out the above stages of EIA at all stages of preparation of documentation on the planned economic and other activities submitted to the state ecological expertise.

### **The results of the EIA**

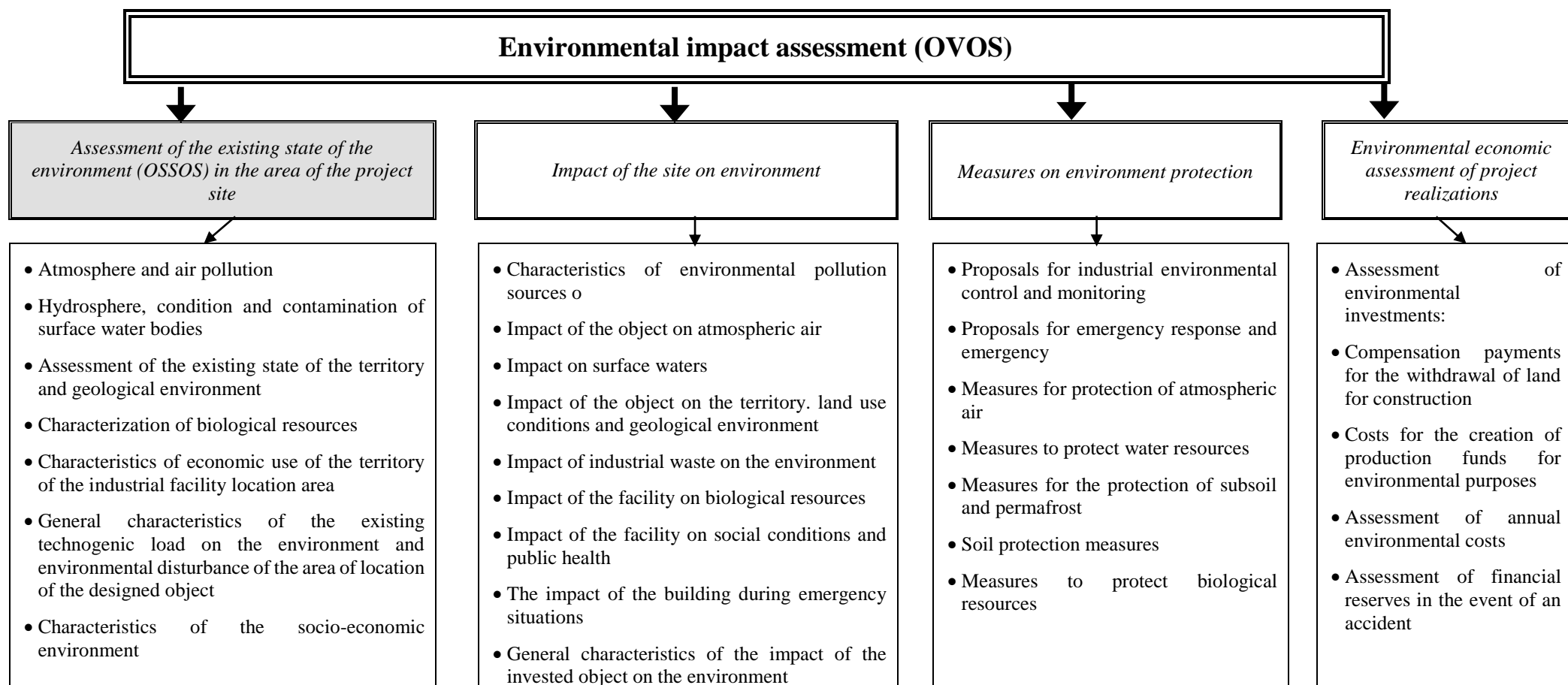
The result of the EIA is information on the nature and extent of the environmental impact of the proposed activity, alternatives to its implementation, assessment of environmental and related social, economic and other consequences of this impact and their significance, the possibility of minimizing impacts.

As EIA reviewed in previous chapter EIA is rather similar in different countries by the content. For example, Environmental Impact assessment according to EU standards can be found in guideline documentation<sup>13</sup>

---

<sup>13</sup> Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report (Directive 2011/92/EU as amended by 2014/52/EU) (Electronic resource)  
[http://ec.europa.eu/environment/eia/pdf/EIA\\_guidance\\_EIA\\_report\\_final.pdf](http://ec.europa.eu/environment/eia/pdf/EIA_guidance_EIA_report_final.pdf)

Picture 2. Recommended content of OVOS /EIA sections as a part of project documentation



---

## Typical content of OVOS / PMOOS report

### Introduction

1. Basic engineering solutions
  - 1.1. General information
  - 1.2. Site description
  - 1.7. Organization of construction
2. Laws for environmental management and environmental protection (brief review)
  - 2.1. Related International laws
  - 2.2. Legislative acts of the Russian Federation
3. Results of environmental impact assessment
  - 3.1. Results of atmospheric air impact assessment
    - 3.1.1. Period of construction
    - 3.1.2. Operation period
  - 3.2. Results of water resources impact assessment
    - 3.2.1. Construction period
    - 3.2.2. Operation period
  - 3.3. Results of evaluation of physical effects
    - 3.3.1. Construction period
    - 3.3.2. Operation period
  - 3.4. Results of soil-vegetation cover impact assessment
    - 3.4.1. Construction period
    - 3.4.2. Operation period
  - 3.5. Results of vegetation impact assessment
    - 3.5.1. Construction period
    - 3.5.2. Operation period
  - 3.6. Results of subsoil and geological environment impact assessment
    - 3.6.1. Construction period
    - 3.6.2. Operation period
  - 3.7. Results of fauna impact assessment
    - 3.7.1. Construction period
    - 3.7.2. Operation period
  - 3.8. Results of waste handling impact assessment



- 
- 3.9. Results of social-economic conditions impact assessment
    - 3.9.1. Impact on indigenous peoples (if any)
    - 3.9.2. Impact on social-economic conditions
  - 3.10. Public engagement
  - 4. Environmental protection measures
    - 4.1. Measures to reduce emissions of pollutants into the atmosphere
    - 4.2. Physical factors impact mitigation measures
    - 4.3. Water resources impact mitigation measures
    - 4.4. Reclamation of disturbed lands
    - 4.5. Measures to protect vegetation cover
    - 4.6. Measures on protection of geological environment
    - 4.7. Measures to protect fauna
    - 4.8. Measures of waste impact mitigation
      - 4.8.1. General requirements for design solutions on minimization of adverse impact on environment and basic engineering design solutions
      - 4.8.2. Additional organizational measures
    - 4.9. Measures on interaction with indigenous population
  - 5. Measures to minimize probable emergency situations and their impact mitigation
    - 5.1. Study of principal reasons for emergency situations
    - 5.2. Brief description of scenarios of the most probable accidents and most hazardous ones
    - 5.3. Results of accidents risk assessment
    - 5.4. Evaluation of environmental impact in case of emergency
      - 5.4.1. Impact on atmospheric air
      - 5.4.2. Impact on water bodies
      - 5.4.3. Impact on soil mantle and grounds
      - 5.4.4. Impact on biological resources
    - 5.5. Prevention and mitigation measures for probable emergency situations and their environmental consequences in the region
  - 6. List and calculation of costs for environmental measures and compensatory payments
    - 6.1. Calculation of costs related to compensation of damage to vegetation cover
    - 6.2. Evaluation of damage to fauna
    - 6.3. Justification of cost for reclamation of lands
-

- 6.4. Calculation of payments for usage of water bodies
  - 6.5. Cost of land plots lease
  - 6.6. Industrial environmental monitoring
  - 6.7. Payment for pollution of atmospheric air
  - 6.8. Payment for pollutants discharge
  - 6.9. Payment for production and consumer waste disposal
  - 6.10. Cost of waste delivery
  - 6.11. Environmental insurance
  - 6.12. Summary figures of environmental costs and payments
  - 6.13. Reserving of financial means for emergency response and elimination of consequences
- Conclusion

Let's take some time on economic calculations related to EIA<sup>14</sup>

### **Calculation of payments for usage of water bodies**

Calculation of payment for usage of water bodies is carried out in accordance with See Annex 3 for details<sup>15</sup>.

Example calculation for water consumption from water body – Amur river in Khabarovsk region:

In 2022 with respective coefficient

$441.012 \text{ thous. m}^3 \setminus \text{period} * 264 \text{ RUR per } 1 \text{ thous. m}^3 * 2.93 = 341131.60 \text{ RUR}$  / for period of construction.

In 2023 with respective coefficient, identified in Decree of the Government of the Russian Federation No. 1509 of December 26, 2014 "On the Rates of payment for the Use of Water Bodies in Federal Ownership and Amendments to Section I of the rates of payment for the use of water bodies in Federal Ownership"

$1095.800 \text{ thous. m}^3 \setminus \text{year} * 264 \text{ RUR per } 1 \text{ thous. m}^3 * 3.22 = 931517.664 \text{ RUR}$  / year for period of operation.

---

<sup>14</sup> For more details on environmental fee calculation see Pinaev V.E., Ledashcheva T.N. Environmental impact fee calculation in Russia for EIA – modern practices. Учебное пособие – М.: Мир науки, 2019. – Режим доступа: <https://izd-mn.com/PDF/20MNNPU19.pdf> — Загл. с экрана. ISBN 978-5-6042807-1-3

<sup>15</sup> For more details in Russian see Decree of the Government of the Russian Federation No. 1509 of December 26, 2014 "On the Rates of payment for the Use of Water Bodies in Federal Ownership and Amendments to Section I of the rates of payment for the use of water bodies in Federal Ownership" and Decree of the Government of the Russian Federation of December 30, 2006 No. 876 "On the rates of payment for the use of water bodies in federal ownership"

**Calculation of fees for negative impact on environment (emission, discharge, wastes disposal)****Payment for pollution of atmospheric air**

The payments are calculated with the use of standard fee rates approved by the RF Government Decree of 13 September 2016 N 913 On rates of the payment for negative impact on environment and additional coefficients

Example calculations provided below in tables 2-1 and 2-2

Table 2-1. Payment for emissions of pollutants into atmospheric air for the 1st year of construction

Name of substance	Total emission of substance (t/period)	Standard fee rate for emission of 1 ton of pollutant, RUR	Coefficient for 2022	Payment for emissions of pollutants into atmosphere, RUR / period
Manganese	0,00515900	5473,5	1,19	33,60
Nitrogen dioxide (nitrogen dioxide (IV))	13,38011125	138,8	1,19	2210,02
Nitrogen oxide (oxide of nitrogen (II))	2,17421233	93,5	1,19	241,91
Sulfur dioxide (sulphurous anhydride)	1,65191080	45,4	1,19	89,25
Saturated hydrocarbons C <sub>12</sub> -C <sub>19</sub>	1,67050300	10,8	1,19	21,47
Inorganic dust 70 – 20 %	0,01973050	56,1	1,19	1,32
Inorganic dust to 20%	2,90181933	36,6	1,19	126,39
<b>Total</b>				<b>2723,95</b>

Table 2-2. Payment for emissions of pollutants into atmospheric air for exploitation

Name of substance	Total emission of substance (t/year)	Standard fee rate for emission of 1 ton of pollutant, RUR	Coefficient for 2022	Payment for emissions of pollutants into atmosphere, RUR /year
Manganese	0,33325300	5473,5	1,19	2170,63
Nitrogen dioxide (nitrogen dioxide (IV))	73,53158200	138,8	1,19	12145,36
Nitrogen oxide (oxide of nitrogen (II))	11,95889400	93,3	1,19	1327,76
<b>Total</b>				<b>15643,75</b>

**Payment for pollutants discharge**

The payments are calculated with the use of standard fee rates approved by the RF Government Decree 913 – in table 2-3 and 2-4 fees for pollutants discharge in period of construction and exploitation.

**Table 2-3 Payment for discharge of pollutants with sewage waters during construction**

Name of substance	Total discharge of substance (t/year)	Standard fee rate for emission of 1 ton of pollutant, RUR	Coefficient for suspended solids*	Coefficient for 2022	Payment for discharge of pollutants, RUR/year
Suspended substance	4,931	977,2	1,17	1,19	6708,90
Petrochemicals	0,056	14711,7		1,19	980,39
BOD <sub>tot</sub>	3,331	243		1,19	963,23
<b>Total</b>					<b>8652,51</b>

\* - The rate of payment for discharges of suspended substances is applied using a coefficient defined as the inverse of the sum of the permissible increase in the content of suspended substances when wastewater is discharged to the background of the reservoir and the background concentration of suspended substances in the water of a water body adopted when setting standards for maximum permissible discharges of pollutants. (i.e. according to EBA data =  $1 / (0.35 + 0.5) = 1.17$ )

**Table 2-4 . Payment for discharge of pollutants with sewage waters during operation**

Name of substance	Total discharge of substance (t/year)	Standard fee rate for emission of 1 ton of pollutant, RUR	Coefficient for suspended solids	Coefficient for 2022	Payment for discharge of pollutants, RUR/year
Methanol	276,282	7355,9		1,19	2418440,29
Suspended substance	53,236	977,2	1,17	1,19	72430,54
Ammonium nitrogen (N)	0,13	1190,2		1,19	184,12
Nitrites	10,233	7439		1,19	90586,71
Nitrates	90	14,9		1,19	1595,79
Phosphates	0,13	3679,3		1,19	569,19
<b>Total</b>					<b>2583806,64</b>

**Payment for production and consumer waste disposal**

Production and consumer wastes, industrial and domestic sewage waters should be given over to licensed organizations for processing. Wastes for disposal are also given to contractor and additional fee for the state is calculated and paid according 913 Decree. Waste disposal fee is calculated in the tables below for period of construction and period of exploitation (each year). Example calculation is given below in tables 2-5 and 2-6

**Table 2-5 Amount of payment for waste disposal for the whole period of construction**

Hazard class of waste	Quantity, t	Standard fee rate, RUR/t	Additional coefficient for 2022	Amount, RUR / period
Waste of the 4 <sup>th</sup> class	792,322	663,2	1,19	625306,86
Waste of the 5 <sup>th</sup> class	4201,589	17,3	1,19	86498,11
<b>Total</b>				<b>711804,97</b>

**Table 2-6 Amount of payment for waste disposal for the period of operation, year**

Hazard class of waste	Quantity, t	Standard fee rate, RUR/t	Additional coefficient for 2022	Amount, RUR / year
Waste of the 4 <sup>th</sup> class	510,039	663,2	1,19	402526,86
Waste of the 5 <sup>th</sup> class*	57,499	17,3	1,19	1183,73
<b>Total</b>				<b>403710,59</b>

\* - remember rate is different for different industries

For sample calculations see Annex 3 Decree 913 in addition to it one should know that there is additional coefficient for 2022 – 1.19 entered into force with Decree of the Government of the Russian Federation No. 274 of March 1, 2022.

"On the Application of Payment Rates for Negative Environmental Impact in 2022" and some substances are missing in this decree and one should follow recommendation of Ministry of Natural resources while calculating fees for pollution – emissions of such substances as abrasive dust, carbon (soot), iron oxide, by their physical properties related to solid particles, it is advisable to take into account in the emissions as suspended substances according the Ministry of natural resources and environment of the Russian Federation (explanation letter dated January 16, 2017 # AC-03-01-31/502

Regarding additional coefficient 2 (which will we not use for calculations) see MNR letter of 16 December 2016 N ОД-06-01-31/25520 On additional coefficient 2

### **Reserving of financial means for emergency response and elimination of consequences**

Measures for containment and elimination of emergency situations consequences are to be planned and implemented to comply with requirements of industrial safety.

In the Art. 10 of Federal Law "On Industrial Safety of Hazardous Production Facilities" there is a requirement for subsoil user to have deposited reserves of financial means and physical resources for containment and elimination of accident consequences, to create systems of monitoring, warning, communication, and support of actions in case accident and maintain this systems ready for operation.

Demand for depositing of financial resources because of risks of accidents is combined of:

- ✓ cost of elimination of accident consequences;
- ✓ amounts of compensation of damage to life, health, or property of other persons and environment in case of accident.

Complaint compensations of damage due to accidents are carried out in accordance with procedure specified in Law "Concerning the Protection of the Natural Environment" and Art. 612 and 1064 of Civil Code of the Russian Federation. Compensation of damages to property units and/or other actual losses is carried out in case of evidence and provability of actual damage in accordance with policy conditions or properly made claims.

In accordance with Art. 10 of Federal Law of July 21, 1997, No. 116-FZ "On Industrial Safety of Hazardous Production Facilities", reserving of financial resources for containment and elimination of accident consequences is provided.

It is expected that taking into account implementation of multipurpose measures and usage of equipment including those which is intended for nature protection purposes, general costs of protection of environment and ecological safety will be equal about 3% of estimated cost of construction.

In accordance with Federal Law “On Protection of Environment” (2002) “it is forbidden to change cost of project works and approved projects at the expense of exclusion of the planned measures of environmental protection from these works and projects in the course of designing of construction, reconstruction, refurbishment, preservation, and demolition of buildings, structures, and other facilities” (art. 36).

For more detail on emergency response – environmental, fire and industrial safety see next chapters. And remember: “The feat is a consequence of someone's negligence”

To review practices of EIA in other countries, please, see references.

### 3. ENVIRONMENTAL MANAGEMENT AND ENVIRONMENTAL AUDITING AT DIFFERENT STAGES OF PROJECT CYCLE

As mentioned in the introduction there is no general law on HSE or Environmental audit in Russia we have to follow requirements from federal legal acts and other norms.

As unusually we will start with our project cycle scheme to identify ourselves in projects cycle and make sur that we understand at this stages of project cycle this instrument is applicable in this case – Environmental audit.

**Environmental audit** is independent, complex, documented assessment of compliance of a business or entity with requirements, including regulations and legal requirements, in the field of environmental protection, requirements of international standards and preparation of recommendations for improving such activities (according Federal Law of January 10, 2002 N 7-FZ “On Environmental Protection”)

This till the moment is the only legal explanation what environmental audit is. Traditionally appearance of environmental audit in Russia is linked with foreign investors who came after the “perestroika” to the territory of former USSR.

One should remember that audit is only a method of control and improvement, first of all Management should be implemented to make sure that auditor has the base to review during the site visit.

Environmental audits are typically divided into Phase I audit (when fulfilment of legal requirements and onsite practices are reviewed) and Phase II audit when already samples of soil and water are take for analysis)

#### Main tasks of environmental auditing

- ✓ data analysis to identify past and existing environmental issues;
- ✓ data analysis to determine polluted areas, types and extent of pollution;
- ✓ identification and evaluation of equipment and technologies related to environmental protection at the facility;
- ✓ analysis of the situation in the field of industrial and economic activities that have an impact on the environment, including public opinion;
- ✓ analysis of the security of the organization of the regulatory framework;
- ✓ analysis of permits ...

**Subjects of Environmental auditing** – permitting and other documentation on environment protection, plus activities of the enterprise affecting environment.

**Criterion for assessment during environmental audits** - specific requirements from environmental legislation, on rational use of natural resources, ensuring environmental safety, in standards, as well as in the environmental policy of the organization and the procedures established within the framework of the environmental management system existing in the organization.

#### Principles of environmental audits

- ✓ Independence,
- ✓ Complexity,
- ✓ Documentality
- ✓ Confidentiality,
- ✓ Responsibility.

---

***Principles of environmental audit according to GOST R ISO 19011-2012:***

- integrity;
- impartiality;
- due professional care;
- confidentiality-information security;
- independence - the basis of impartiality and objectivity of audit conclusions;
- evidence-based approach-the rational method for reaching reliable and reproducible audit conclusions in a systematic audit process.

**Environmental audit activities**

- implementation of environmental standards in accordance with the legislation in the field of environmental protection, as well as the requirements of the organization;
- determining the level of environmental friendliness of the company;
- functioning of the environmental management system;
- obtaining an environmental certificate;
- preparation of environmental Declaration and company reports on environmental activities, etc.

**Terms of environmental audit<sup>16</sup>**

*Auditor* - the person who conducts the audit.

*Audit team* - one or more auditors performing the audit, supported by technical experts, if necessary. One of the auditors in the audit team is usually appointed by the team leader. The group audit may include auditors-in-training.

*Technical expert* - a person with the specific knowledge or experience required by the audit team. Special knowledge or experience includes knowledge or experience relating to the organization, process or activity being audited, as well as knowledge of the language and culture of the country in which the audit is conducted. The technical expert does not have the authority of an auditor in the audit team.

*Customer* -organization or person who ordered the audit.

*Observer* - a person accompanying the audit team, but not conducting the audit. An observer may be a representative of the audited organization, Supervisory authority or other interested party who oversees the environmental audit. The observer is not a member of the audit team and does not influence or interfere with the audit.

*Audit program*-a set of activities to conduct one or more audits planned for a specific period of time and aimed at achieving a specific goal.

*Audit criteria*-a set of policies, procedures or requirements used as a reference against which audit evidence obtained during the audit is compared. If the audit criteria are legal requirements (including legislative or other mandatory requirements), the audit findings (observations) often use the terms "appropriate" or "nonconforming".

*Audit evidence*-records, statements of facts or other information that are related to the audit criteria and can be verified.

---

<sup>16</sup> According to GOST R ISO 19011-2012 Guidelines for auditing management systems



*Audit report* ( results of environmental audit) - audit output after consideration of audit objectives and all conclusions.

**Tasks of environmental audit** (According to GOST R ISO 19011-2012 Guidelines for auditing management systems)

- justification of environmental strategy and policy of the enterprise;
- identification of priorities in the planning of environmental activities of the enterprise, identification of additional opportunities for its implementation;
- verification of compliance with environmental legislation by the business entity;
- improving the efficiency of regulation of the impact of the business entity on the environment;
- reducing the risk of emergencies related to environmental pollution.

### **Types of environmental audit**

1. Compliance audit-determination of the company's economic activity compliance with environmental legislation.
2. Management audit-assessment of management efficiency, compliance with the formed internal management system and corporate policy, establishing the degree of environmental risk associated with the activities of the enterprise.
3. Supply audit - assessment of environmental safety of raw materials and equipment used in the production of products; identification of alternative resource-saving technologies that contribute, in addition, to reduce the cost of goods.
4. Real estate audit-assessment of past economic damage from pollution, as well as potential environmental liability.
5. Waste management audit-hazard assessment of industrial waste through recovery, disposal, disposal and disposal.
6. Energy audit-assessment of energy consumption and possible ways to reduce it.
7. Energy audit-assessment of energy consumption and possible ways to reduce it.
8. Strategic audit-assessment of the long-term business strategy taking into account the environmental characteristics of the enterprise and identify potential business partners with an environmentally oriented management system.
9. Insurance environmental audit-assessment of the risk and amount of damage as a result of possible man-made accidents, technological failures, natural processes, etc.to justify and implement environmental insurance.
10. Audit of accumulated damage-assessment of environmental hazards for past accumulated damage to the enterprise or facility in the transition to another type of property.
11. Investment environmental audit-assessment of the necessary costs for the environmental aspects of the investment in reconstruction, expansion, conversion, at the closing of the enterprise.

---

## Types of environmental audit according to GOST R ISO 19011-2012

### 1. Internal audits - "first party audits".

Conducted by or on behalf of the organization for management or other internal review purposes and may serve as the basis for a Declaration of conformity. In many cases, especially in small organizations, independence in auditing can be demonstrated by a lack of accountability for the activities audited, or by impartiality and a lack of conflict of interest.

The internal environmental audit is conducted by regular auditors - employees of the enterprise (if any) - and should be an independent activity to verify and evaluate the work in the interests of the company's management.

In case of internal audit, the company's management forms an audit team from among its own employees, which may include third-party specialists.

The purpose of internal audit is to help employees to perform their environmental protection functions as efficiently as possible. The main task is to carry out constant monitoring and develop measures to reduce the negative consequences.

### 2. External audits - "second party audits" and "third party audits".

*The second party* audits are conducted by parties interested in the activities of the organization, such as consumers or other persons on their behalf.

*Third party audits* are conducted by external independent organizations, such as regulatory, Supervisory or registration or certification bodies.

External environmental audit is conducted on a contractual basis with the auditor in order to objectively assess the compliance of the company's activities with the norms and requirements of environmental legislation, as well as to prepare recommendations for improving the environmental activities of the enterprise, improving its efficiency, correcting violations of the said legislation and finding new alternative external and internal reserves to reduce the risk of harm to the environment.

Environmental audit procedure should preferably be carried out by a third party to ensure the independence and objectivity of the audit study. But representatives of the audited company can also be included in the audit group.

## Stages of environmental audit

### *Stage 1. Organization of the audit.*

- Establish initial contact with the auditee (section 6.2.2 GOST R ISO 19011-2012).

Can be formal or informal. The objectives of the initial contact may be: to establish communication and communication channels with the representatives of the audited organization; to confirm the authority to conduct the audit; to obtain access to relevant documentation, etc.

To determine whether the audit (paragraph 6.2.3 GOST R ISO 19011-2012).

To ensure that the audit objectives can be achieved, it is necessary to determine the feasibility of the audit, the adequacy of information for audit planning, adequate assistance and cooperation from the audited organization, sufficient time and resources to perform the audit.

- Analysis of documents in preparation for the audit (p. 6.3.1 GOST R ISO 19011-2012).

It is necessary to analyze the documentation of the relevant management system of the audited organization. Collect information for the preparation of audit activities and relevant working documents - for example, related to processes, duties. Review system documentation to identify possible gaps.

- Preparation of the audit plan (p. 6.3.2 GOST R ISO 19011-2012).

The audit team leader should prepare an audit plan based on the information contained in the audit program and the documentation provided by the audited organization.

- Distribution of work between members of the audit team (p. 6.3.3 GOST R ISO 19011-2012).

The audit team leader, in consultation with members of the audit team, should identify and assign responsibility to each member of the group for auditing specific processes, activities, functional units or areas of operations.

- Preparation of working documents (p. 6.3.4 GOST R ISO 19011-2012).

Members of the audit team should collect and analyse information relevant to their area of responsibility and prepare working papers in an appropriate manner to record and record audit evidence.

#### *Stage 2. Preparation for on-site audit.*

In the event, or work on the audit consists of:

- Holding a preliminary meeting (para. 6.4.2 GOST R ISO 19011-2012).

The objectives of the preliminary meeting are:

a) confirmation of the agreement of all parties (e.g. audited entity, audit team) on the audit plan;

b) representation of audit team members;

c) ensuring confidence that all planned activities within the framework of the audit can be carried out.

- Analysis of documents during the audit (p. 6.4.3 GOST R ISO 19011-2012).

It is necessary to analyze the documentation of the audited organization in order to:

a) determine the compliance of the system (as far as it is reflected in the documentation) with the audit criteria;

b) collect information to facilitate the implementation of the planned activities within the framework of the audit.

Auditors must establish whether the information provided in the documents (Annex b to GOST R ISO 19011-2012):

- complete (all expected information is contained in the submitted document);
- correct (the content of the document corresponds to other reliable sources, such as standards and rules);

- compatible (the provisions of the document are consistent with each other and related documents);
- relevant (the provisions contained in the document are in force at the time of verification).

As well as:

- whether the documents under review cover the scope of the audit and provide sufficient information to support the audit objectives;
- whether the use of information and communication technologies in accordance with the audit methods used contributes to the effective conduct of the audit: special attention should be paid to the information security provided by the applicable data protection rules (especially for information that goes beyond the scope of the audit, but is contained in the documentation provided).
- Exchange of information during the audit (p. 6.4.4 GOST R ISO 19011-2012).

In the course of an audit, it may be necessary to enter into formal agreements for the exchange of information between the audit team and the audited entity, the audit client and, possibly, with external bodies (for example, Supervisory bodies), especially in cases where legislation requires mandatory notification of non-conformities.

- The role and responsibilities of attendants and observers (p. 6.4.5 GOST R ISO 19011-2012).

Accompanying persons and observers may be present during the work of the audit team. They should not influence or interfere with the audit. If this cannot be guaranteed, the head of the audit team has the right to refuse observers to participate in some audit activities.

- Collection and verification of information (p. 6.4.6 GOST R ISO 19011-2012).

During the audit, information relating to the objectives, scope and criteria of the audit, including information relating to inter-office interactions, activities and processes, should be collected through appropriate sampling and verification. Only information that can be verified should be accepted as audit evidence. Audit certificates must be registered. If any new or changed risks become known to the audit team during the collection of evidence, they should be reviewed and appropriate action taken.

- Formation of audit conclusions (p. 6.4.7 GOST R ISO 19011-2012).

To obtain audit findings, audit evidence must be compared and evaluated against audit criteria. Audit findings can indicate conformity or nonconformity with the audit criteria. If this cannot be guaranteed, the head of the audit team has the right to refuse observers to participate in some audit activities.

- Preparation of conclusions on the results of the audit (p. 6.4.8 GOST R ISO 19011-2012).

The audit team should complete the following before the final meeting:

- a) review the audit findings and any other relevant information collected during the audit for compliance with the audit objectives;
- b) agree on the audit findings taking into account the uncertainty inherent in the audit process;
- C) prepare recommendations, if it is provided by the audit objectives;
- d) discuss audit actions, if required.

- Conducting a closing meeting (paragraph.6.4.9 GOST R ISO 19011-2012).

The final meeting should be organized by the head of the audit team in such a way that the findings and conclusions of the audit are clear and recognized by the audited organization. The final meeting should involve the heads of the organization being audited and, where appropriate, the staff responsible for the functions or processes that have been audited, as well as the audit client and other parties.

*Stage 3. Preparation and distribution of the audit report.*

- Preparation of the audit report (p. 6.5.1 GOST R ISO 19011-2012).

The audit team leader is responsible for the preparation and content of the audit report. The audit report shall contain complete, accurate, clearly stated and understandable audit records in accordance with the audit procedures.

- Distribution of the audit report (p. 6.5.2 GOST R ISO 19011-2012).

The audit report shall be prepared and submitted within the agreed time frame. In the event of a delay, the reasons for the delay should be communicated to the audited entity and to the person responsible for managing the audit program. The audit report shall have a date of issue, be properly reviewed and approved in accordance with the procedures of the audit program. The audit report should then be sent to the recipients defined by the audit procedures.

*Stage 4. The completion of the audit.*

An audit is considered to be completed if all planned audit activities have been performed or on the basis agreed with the audit client. For example, there may be unforeseen situations that prevent the audit from being completed in accordance with the plan (clause 6.6 GOST R ISO 19011-2012).

*Stage 5. Actions based on audit results.*

Audit findings may, depending on the objectives of the audit, indicate the need for corrections, corrective and preventive actions or improvement actions. Such actions are usually developed and implemented by the audited organization within the agreed time frame. If necessary, check the organization should inform the person responsible for managing audit program and the audit team on the status of implementation of these actions (p. 6.7 GOST R ISO 19011-2012).

## **Methods of environmental audit**

The methods chosen for the audit depend on the objectives, scope and criteria of the audit, as well as on the timing and location of the audits. The audit method should also take into account the current level of audit competence and any uncertainties (errors) arising from the application of these methods. The use of multiple and a combination of different methods can optimize the productivity and efficiency of the audit process and its results (Annex B to GOST R ISO 19011-2012).

*1. Carrying out environmental audit activities at the places of production activities of enterprises.*

- Interaction with people can be carried out through interviews, filling in checklists and questionnaires with the participation of the staff of the audited organization, the analysis of documentation with the participation of representatives of the audited organization, the implementation of representative samples.

- Without human interaction, verification can be carried out through the analysis of documentation (e.g., analysis of records, data), monitoring of performance, visits to production units, filling in checklists, the implementation of representative samples.

## *2. Distant environmental audit*

Audit activities at a distance are carried out in any place, except for the location of departments and production activities of the audited organization, regardless of the distance.

- Interaction of people is carried out through interactive means of communication: interviews, filling out checklists and questionnaires, analysis of documentation with the participation of representatives of the audited organization.

- Without human interaction, the work is carried out in the form of analysis of documentation, monitoring the performance of work with the help of technical means, providing supervision of production activities, taking into account social and legal requirements, data analysis.

Environmental audit may be conducted before environmental expertise, environmental and sanitary-epidemiological inspections. The environmental audit performed can contribute to the successful completion of these procedures, although it cannot replace them. Let us start with phase I and then proceed with Phase II

### **Objective of Phase I assignment can be following:**

- 1) to assess environmental risks at the subject property based on site inspection, interviews with appropriate site contacts, the review of documents made available during the site visit and in the office prior to the visit;
- 2) to identify and mark planned locations of boreholes for ground sampling and wells for underground water sampling (if required).

Environmental management and environmental auditing at different stages of project cycle are rather similar in general – the difference is only in the process auditor or manager reviews – either this is construction or production, or reclamation of site.

As mentioned in the introduction there is no general law on HSE or Environmental audit in Russia we have to follow requirements from federal legal acts and other norms.

Let us start with Wastes

Waste management is governed by the following key regulatory documents main is Federal law “On Production and Consumption Wastes”, No.15-FZ dated 24 June 1998

Please note that that requirements for waste processing are not limited to this legal acts and some requirements are included in different San Pin’s, GOST’s and other legal documents.

One should remember, that that environmental auditing is not only limited to paper work, but auditor should be ready to identify non compliances in practices during site tour.

## **Environmental audit Phase I**

Objective of Phase I assignment can be following:

- 1) to assess environmental risks at the subject property based on site inspection, interviews with appropriate site contacts, the review of documents made available during the site visit and in the office prior to the visit;
- 2) to identify and mark planned locations of boreholes for ground sampling and wells for underground water sampling (if required).

### What should be covered in the report:

- Site description and operations, production processes, site history and setting
- Environmental management and permitting (IED requirements)
- Emissions (Air, noise, vibration)
- GHG
- Water, wastewater and storm water management
- Waste and hazardous waste
- Hazardous materials storage and handling
- Soil and groundwater
- Restricted substances (ACM, PCBs, ODSs, PFAS<sup>17</sup> etc.)
- Radioactive materials
- Environmental organization
- Emergency preparedness
- WEEE
- etc. depending on the profile of the site industry / activity.

Let us review typical legal requirements based on RF legislation:

### General topics

Extract from most general legal requirements presented in table 3-1 below, this requirements are common for all sites (enterprises) in Russian Federation. Check what are similar requirements for Your native country or EU, US or UK.

**Table 3-1. General legal requirements for environmental audit**

Requirement	Legal document
Are there any prescriptions from state Supervisory bodies? Is there evidence of prescriptions closure / fulfilment?	The Federal law of 26.12.2008 N 294-FZ "On protection of the rights of legal entities and individual entrepreneurs at implementation of the state control (supervision) and municipal control»
Is the company registered as an object having a negative impact on the environment	Federal law of 10 January 2002 N 7-FZ "On environmental protection" Art. 69.2.

<sup>17</sup> Per- and polyfluoroalkyl substances (PFASs) are synthetic organofluorine chemical compounds that have multiple fluorine atoms attached to an alkyl chain for more details see <https://www.epa.gov/pfas/pfas-explained>



Is the Register of inspections conducted by officials of the state control body, the municipal control body available?	The Federal law of 26.12.2008 N 294-FZ "On protection of the rights of legal entities and individual entrepreneurs at implementation of the state control (supervision) and municipal control» Art. 16.
Are there any complaints from residents, the public? What is the reaction of the Site (Enterprise)?	Federal law of 10.01.2002 N 7-FZ "On environment protection", Art. 11
Are responsibilities and powers in the field of environment protection distributed?	Federal law of 10.01.2002 N 7-FZ" On environment protection " Art. 67
Is the production control of compliance with legal requirements in the field of environmental protection performed?	Federal law of 10.01.2002 N 7-FZ" On environment protection " Art. 67
Have Managers and specialists responsible for decision-making regarding negative impact on the environment, been trained in the field of environmental protection and environmental safety?	Federal law of 10.01.2002 N 7-FZ" On environment protection " Art. 73
The order on appointment of the persons responsible for carrying out production control of air protection and documents about the organization of ecological service (Department).	item 2 of Art. 67 of the Federal law of 10.01.2002 N 7-FZ "On environment protection", item 1, 3 of Art. 25 of the Federal law of 04.05.1999 N 96-FZ "On protection of atmospheric air".
Documents confirming the necessary training of employees responsible for decision-making in the implementation of economic and other activities that have or may have a negative impact on the environment	Art. 73 of the Federal law of 10.01.2002 N 7-FZ"On environment protection"

Please note that this is only a general questions.

Further the auditor has to proceed by topics i.e. atmospheric (ambient air), wastes, waste water, GHG etc.

Let's review some examples.

### Waste management

Waste management activities are regulated by the Federal Law on Production and Consumption Waste Management (#89-FZ of 24.06.1998). Following is required:

- ✓ comply with waste management rules, regulations and standards and fulfil other waste-related requirements established by the national legislation;
- ✓ develop waste generation and disposal limits documents (plans) aimed at reduction of waste generation (with the exception of small and medium-sized businesses);
- ✓ determine the hazard class of waste (1 to 5) and have it confirmed by the federal executive body authorised by the Government of the Russian Federation authority, following the established procedure

- ✓ effect payments for adverse environmental impact associated with waste disposal;
- ✓ implement low-waste technologies, based on prevention regimern science achievements, and best available techniques;
- ✓ conduct inventories of waste disposal facilities in compliance with the requirements for the inventory of waste disposal facilities as established by the federal executive authority in the field of environmental protection;
- ✓ conduct environmental condition and pollution monitoring of waste disposal sites;
- ✓ provide the necessary waste management information in accordance with the established procedure;
- ✓ fulfil requirements for the prevention of accidents associated with waste management and take immediate response measures if such incidents occur;
- ✓ develop prevention and response plans for potential manmade emergencies associated with waste management, including cleanup and remediation measures;
- ✓ provide professional training of personnel admitted to collection, treatment, recycling and disposal of wastes of Hazard Class 1 to 4.

Usually questionnaires for the site visits are given in table format – this is more comfortable for the auditor.

**Table 3-2. Waste management requirements**

Requirement	Legal document
Are WGSDL approved?	Art. 11 Federal law No. 89-FZ of 24 June 1998 “On production and consumption waste”
Was WGSDL developed and approved? Were waste passports developed for each type of generated wastes?	Art. 11 Federal law No. 89-FZ of 24 June 1998 on production and consumption waste»
Is the license to carry out activities on collection, use, neutralization, transportation and disposal of hazardous wastes obtained?	Art. 17 Federal law of 08.08.2001 N 128-FZ On licensing of separate types of activity
Were the persons who admitted to the waste I-IV class of hazard, trained?	Art. 15 of the Federal law of 24 June 1998 n 89-FZ "On production and consumption wastes »
Are the requirements for temporary storage of waste area fulfilled?	SanPiN of 30.04.2003 N 2.1.7.1322-03 Hygienic requirements for placement and neutralization of production and consumption wastes
Is the primary accounting of waste?	Art. 19 Federal law No. 89-FZ of 24 June 1998 On production and consumption waste»
Is information to Regulatory and Supervisory authorities provided in a timely manner?	Art. 19 Federal law No. 89-FZ of 24 June 1998 On production and consumption waste»
Are the requirements for the waste transport fulfilled?	Federal law of 24 June 1998 No. 89-FZ "on production and consumption waste", Art. 16

There are much more requirements in the legal documents. Please check what are the requirements in Your native country on this topic.

Further one should question on water use onsite. This includes:

*Water services* Water services in Russia are usually provided by local branch of Vodokanal, according to the contract.

**Storm-water** Storm water is usually collected into the storm-water system or precipitates in the ground.

**Waste Water Discharged** usually according to the contract.

**Wastewater disposal** The Company's water management and protection performance is regulated by the Water Code of the Russian Federation (Federal Law #74-FZ of 03.06.2006 as amended) and respective bylaws and regulations.

Lets review similar table for water supply and wastewater. See table 3-3 below.

**Table 3-3. Water and wastewater topics**

Requirement	Legal document
Whether the contract for a water intake with the specialized organization is signed?	Order of the Government of the Russian Federation of 12.02.1999 N 167 On Rules for municipal water supply and sewerage systems use in the Russian Federation
Is wastewater transfer organized?	Order of the Government of the Russian Federation of 12.02.1999 N 167 On Rules for municipal water supply and sewerage systems use in the Russian Federation
Are the standards of wastewater discharge and its quality in the receiving sewage network fulfilled?	
Are payments made for wastewater discharges to the receiving sewerage network?	
Working condition of sewer networks	Federal law № 7 "On environmental protection" of 10.01.2002, Art. 67, Water code № 74-FZ of 03.06.2006, CH. 5, art. 39,
Availability of treatment facilities	Federal law No. 7 "On environmental protection" of 10.01.2002 Art. 67, Water code of the Russian Federation №74-FZ of 03.06.2006, CH. 5, art. 39
Organized storm drains, their cleaning / transfer?	Art. 22 №7-FZ" On environment protection " Federal law of 03.06.2006 N 74-FZ Water code of the Russian Federation
Are the standards of storm water discharge and their quality observed?	Art.22 №7-FZ" On environment protection " Federal law of 03.06.2006 N 74-FZ Water code of the Russian Federation

Further details on the topics can be obtained from legal acts. Review local requirements on water supply and discharge of your native country.

### Air protection

The air protection performance of the Company is regulated by Federal Law On Air Protection (#96-FZ of 04.05.99) and supporting bylaws and regulations.

Table 3-4 presents requirements for air protection during audit performance.

**Table 3-4 Emission management requirements**

<b>Requirement</b>	<b>Legal document</b>
Is there a Permit for the emission of pollutants into the atmosphere? Its validity?	Federal law of 04.05.1999 N 96-FZ "On protection of atmospheric air", Art. 14
Have measures been developed and implemented to achieve the MPE?	
Is inventory of emissions of pollutants into the atmosphere developed?	Federal law of 04.05.1999 N 96-FZ "On protection of atmospheric air", Art. 12, Art. 30
Is there an approved Project of maximum permissible emissions into the atmosphere?	
Is there a Schedule for monitoring compliance with the MPE standards on the sources of emissions into the atmosphere air?	Federal law of 04.05.1999 N 96-FZ "On protection of atmospheric air", Art. 25, Art. 30
Is the schedule for monitoring compliance with the MPE at the emission sources being met?	Federal law of 04.05.1999 N 96-FZ "On protection of atmospheric air", Art. 25, Art. 30
Are the standards of output g/s, t/year observed?	Federal law of 04.05.1999 N 96-FZ "On protection of atmospheric air", Art. 25, Art. 14
Regulation of emissions of harmful (polluting) substances into the air during periods of adverse (unfavourable) weather conditions?	Federal law of 04.05.1999 N 96-FZ "On protection of atmospheric air", Art. 19
Materials inventory of emissions of harmful (polluting) substances into the air.	Art. 22, 30 of the Federal law of 04.05.1999 N 96-FZ "On protection of atmospheric air"
Standards of maximum permissible emissions of harmful (polluting) substances into the air	22, 23 of the Federal law of 10.01.2002 N 7-FZ "On environmental protection", Art. 12, 30 of the Federal law of 04.05.1999 N 96-FZ "On protection of atmospheric air".
A plan to reduce emissions of harmful (polluting) substances into the air and a progress report on the implementation of this plan in order to achieve the standards of MPE	part 4 of Art. 12 of the Federal law of 04.05.1999 N 96-FZ "On protection of atmospheric air".
Schedule of production (laboratory) monitoring of compliance with the standards of MPE for the year agreed as part of the standards of MPE.	part 1 of Art. 25 of the Federal law of 04.05.1999 N 96-FZ "On protection of atmospheric air".
The order (scheme) of the notification of territorial authorities of	h. 1 Art. 30 of the Federal law of 04.05.1999 N 96-FZ "On protection of atmospheric air",

Rosprirodnadzor on emergence of emergency emissions.	
Order on appointment of responsible person for operation, repair and maintenance of the equipment for emission cleaning equipment	section 4.5 of GOST 17.2.3.02-78 Protection of nature. Atmosphere. Rules for establishing permissible emissions of harmful substances by industrial enterprises. Decree of USSR Gosstandart dated 24.08.1978 N 2329.
Calculation of payment for negative impact on the environment, including payment orders or other accounting documents confirming the timeliness of payment for negative impact on the environment.	Art. 30 of the Federal law of 04.05.1999 N 96-FZ "On protection of atmospheric air"
Report on form 2-TP (air) "Information on air protection"	16 of the Federal law of 10.01.2002 N 7-FZ" On environmental protection", Art. 28 of the Federal law of 04.05.1999 N 96-FZ" On protection of atmospheric air".

Further related topic – sanitary protective zone – a buffer zone around enterprise has to be checked.

### Sanitary Protection Zone

In accordance with the sanitary classification as specified in SanPiN 2.2.1/2.1.1.1200-03 details of SPZ are reviewed. For typical requirements see table 3-5.

Table 3-5 Requirements regarding SPZ

Requirement	Legal document
Is the size of SPZ in compliance with legal requirements?	SanPiN. 2.2.1/2.1.1.1200-03 " Sanitary protection zones and sanitary classification of enterprises, structures and other objects»,
Is the SPZ of the enterprise set?	Federal law of 04.05.1999 N 96-FZ "On protection of atmospheric air", Art. 16
Is there a schedule for monitoring MPE at the border of SPZ developed?	SanPiN. 2.2.1/2.1.1.1200-03 "Sanitary protection zones and sanitary classification of enterprises, structures and other objects", section 3
Is the control of atmospheric air at the border of SPZ performed?	Federal law of 04.05.1999 N 96-FZ "On protection of atmospheric air", Art. 30
Are the standards of air quality at the border of SPZ met?	Federal law of 04.05.1999 N 96-FZ "On protection of atmospheric air", Art. 30

Different enterprises have different size of SPZ, it depends on type of industry and production amounts.

Similar requirements are available for other topics.

Please note that this requirements are distributed between different legal documents and should be checked for update. Following we will review Phase II audit process what is more practical and requires soil and groundwater sampling. Detailed sizes of Sanitary protective zones for different industries see in Annex 5.

### Statistical environmental protection reporting

In compliance with Rosstat Order #540 of 29.08.2014 (On the approval of statistical tools for the organization of federal statistical monitoring of the agriculture and the environment) the Company prepares and submits regular statistical monitoring forms 2TP-Air for production facilities and the Camp and the 2TP-Air (periodic)

form for the entire field facilities of the Company. The auditors received documents for 2012-2015 and standard forms 4-OS.

In compliance with Rosstat Order #676 of 29.12.2012 (On the approval of statistical tools for the organisation by Rosprirodnadzor of federal statistical monitoring of land reclamation, removal and utilisation of topsoil) companies should prepare and submit regular statistical form 2TP-Reclamation.

In compliance with Rosstat Order #230 of 19.10.2009 (On the approval of statistical tools for the organisation by Rosprirodnadzor of federal statistical monitoring of water use) the Company should have statistical forms 2TP-Water with the water use data.

In compliance with Paragraph 2 of Art. 19 of the Federal Law on Production and Consumption Waste (#89 of 24.06.1998) the Company needs waste management records and submits standard statistical reporting Form 2TP-Waste.

### **Example of non compliances, which can be mentioned in the audit report**

Example of non compliances found during environmental audit can be found below in the table. Please note that all non compliances You identify during the audit (either site visit or distant auditing) should be supported by citation of legal requirement. If no available and You absolutely need to mention it - mark this as aspect for improvement which is common for best practise.

### **Types of noncompliance**

I.e. NC – noncompliance (Breach of or exception from the law - when all is clear), PNC – potential non compliance (when there is a doubt - No sufficient information or documentation available to assess or verify the compliance status.) and BMP (Best Management Practice): The finding involves facility practices that fall short of Best Management Practices or that may represent opportunities either to further reduce a risk to the environment or the Company, or to improve the health & safety management. Cost-saving opportunities will be included here.

### **Risk assessment**

As was mentioned in introduction to the course there are different risk classes – in simple approach 3 – high, medium and low:

**High:** The finding involves non-compliance with an applicable substantive legal requirement and represents a significant risk to human health, the environment or the company. The Facility must immediately take corrective or preventive action, including any necessary administrative or temporary measures to address the non-compliance or reduce the risk and then resolve or substantially resolve the issue within 30 days of the closing meeting.

**Prevention regimirate:** The finding involves non-compliance with an applicable legal requirement/ Standard and represents a prevention regimirate risk to human health, the environment or the company. The Facility must take corrective action to resolve the issue within 90 days of the closing meeting.

**Low:** The finding involves non-compliance with an applicable legal requirement/ Standard and represents a minor risk to human health, the environment or the company. The Facility must take corrective action as part of its normal continuous improvement program and resolve the issue within 12 months of the closing meeting.

This is typical example and time periods may vary from site, industry etc.

Table 3-6. Example of typical noncompliance found during environmental audit Phase I



Description of non compliance	Legal citation and recommendation
Unlimited access to storage containers for waste of Hazard Class 1	Enclose and limit unauthorised access to the container (RF Government Decree #681 of 3 September 2010 On the approval of the Waste Management Regulations: lighting devices, electrical lamps, which, if inappropriately collected, handled, neutralized, disposed of, or transported, may cause damage to human health, animals, plants, and environment, Paragraph 14)
Absence of results of the field survey and measurements required to confirm the estimated SPZ parameters	Undertake measurements and obtain a positive conclusion for the SPZ design SanPiN 2.2.1/2.1.1.1200-03 Sanitary protection zones and sanitary classification of facilities, buildings, etc.
Absence of permitting environmental documentation (MPD and Discharge Permit)	Develop and obtain approval of a maximal permissible discharge (MPD) Plan. apply for and receive a Decree on the right to use a water body for the discharge of effluents (including development and approval of a programme for regular monitoring of the water body and its water protection area). The PDL Plan must be developed in accordance with the Methods for the development by water users of permissible limits for discharges of substances and microorganisms into water bodies (approved by MNR Order #333 of 07.12.2007).
Noncompliance of the WGSDL (PNOOLR) document and waste passports with the requirements of the environmental protection legislation	According to Art. 6 of Federal Law 89 (as amended), beginning with 01.01.2016 constituent entities of the Russian Federation (Rosprirodnadzor offices in administrative districts) are delegated the authority to approve the guidelines for the development of waste generation and waste disposal limits for economic or other activity of individual entrepreneurs and organizations (with the exception of small and medium-sized businesses) associated with generation of waste at the facilities that are subject to regional government environmental supervision. In practice, Rosprirodnadzor offices do not develop their own methodology but refer to MNR Order #349 of 05.08.2014 on the approval of 'Methodological Guidelines for the Development of Waste Generation and Disposal Limits'. Respective information is posted on Rosprirodnadzor websites.
Absence of the Register of inspections by authorised representatives of Government Regulators, municipal supervisory body	Establish a standard register and keep it in accordance with the regulatory requirements. Federal Law #294-FZ of 26.12.2008 On the protection of rights of legal entities and individual entrepreneurs during implementation of government control (supervision) and municipal control, Art. 8-12
Absence of contract for medical waste management/ transfer	Conclude a contract for the transfer of medical waste. Provide for instruction of personnel engaged in waste management in accordance with requirements of SanPiN 2.1.7.2790-10 Sanitary and epidemiological requirements for medical waste management (accumulation and transportation)

In some cases it is necessary to mention not only non compliance and legal citation, but expected price to close the non compliance. This can be mentioned in conclusion and recommendations.



After performing the report for Phase I audit – performance of Phase II audit can be recommended, if there are suspects that the site may have polluted ground or ground waters.

### Environmental audit Phase II

Phase II environmental auditing activities include soil and ground water sampling. This means that a drilling rig may be necessary for it. There are 2 options for this – either own laboratory and drilling rig, or contractors. Contractors may be preferable since the sites can be located the same week or month from Vladivostok in the Far East of Russia (near Japan), till Kaliningrad in the West at Baltic sea. The distance is rather long and roads are not always comfortable.

Usually consultants use local TISIZ – companies for engineering and geological research located in most big cities of Russia.

As already mentioned, there is no general law on HSE or Environmental audits in Russia, so one should use requirements from different documents and practical experience.

Prior to performing drilling activities onsite we should make sure that will not destroy underground communications. This can be electric cables or various pipes. To identify them in addition to site underground communication map, a good practice is to use underground trace detectors, ie as Photo 3-1 below.

Photo 3-1. Detection of underground communication



The type of detector is up to the drilling team and your preferences.

The drilling rig in Russia is most common on a Kamaz schasy and will. Photo of an average drilling rig and auger at work below at Photo 3-2

Photo 3-2. Drilling rig and Auger



Drilling rigs may be not always clean and leaking – it is necessary to make sure that you will not bring additional pollutions to the site with the equipment of contractors.

Sample Geological-lithological columns of exploratory well is presented in table 3-7

**Table 3-7 Description of Geological-lithological columns**

Geological index	Engineering -geological	Description of the ground	Thickness of EGE, m	Depth of EGE	Depth of water table, m	
					Absolute elevation, m	
					Water occurrence	Standing level
tQIV	1 a	Filled grounds. Represented by mixture of black soil and loam, semisolid one, below 1.0 m – low-plasticity one, medium dense. Within the 0.2-0.3 m interval – fine-grained sand, tawny brown, low saturated.	2,7	2,7	1,90	1,90
adQII-III	2B	Soft-plasticity loam, brown one, with humus drops. Within the 2.7-2.9 m – argillaceous one, of dusty color, with bog odor.	1,3	4,0		

Key: t – technogenic Q – glacial III – tertiary IV – quaternary

Please note that presence of geologist during soil sampling is highly welcome to receive geological data for the exact locations from the first hands. Knowledge of geological basics is highly appreciated for Environmental auditing and Environmental baseline assessment.

### Ground water sampling

Photo 3-3 presents plastic casing for ground water sampling with industrially made cuts for water supply.

Photo 3-3 Plastic casing for ground water sampling



To prevent soil from entering the casing a chop in the bottom is attached, the sides should have either industrial holes / cuts for water penetration (as on photo) or home made by drilling.

Usually casing is made of 1.5 pipes which are screwed together prior to installing into the well (polyethylene should be removed) photo 3-4.

Photo 3-4. Assembling of casing for installation in water well



Polyethylene on casing is put for safety during transport and storage to prevent blocking of holes for water penetration see photo above.

Pushing down the casing for water well by the means of drilling rig is presented on next Photo 3-5

Photo 3-5 Pushing casing into the borehole



Water sampling from water well is usually performed by the means of bailer see photo 3-6 below

Photo. 3-6. Bailer and samples near borehole



An average sampling and analysis program is summarized in Table 3-8 below. Note that samples should be delivered as soon as practical to a certified and accredited laboratory. Contract should be concluded before the start of activities, as well as presence of certain compounds and methodology in accreditation certificate of the lab. Full analytical protocols should be attached to the annexes of the report.

Table 3-8. Example laboratory analytical program

Laboratory analyses	Method	Components	Number of analyses
<i>Soil</i>			
Metals screening	AAA	Hg, As, Cd, Pb, Cu, Zn, Ni, Cr	N
Semi-volatile compounds (SVOC)	GC-MS	PCB , TPH	N
Polycyclic aromatic hydrocarbons (PAH)	HPLC	21 PAH	N
BTEX	GC	Benzene, toluene, ethylbenzene, xylenes	N
VOC, including BTEX	GC	Benzene, toluene, ethylbenzene, xylenes	N
Phenols	GC		N
Chlorinated solvents	GC	Chloroform, carbon tetrachloride, TCE, PCE	N
Pesticides	GC	Chlorinated organic pesticides	N
<i>Water</i>			
Metals screening	AAA	Hg, As, Cd, Pb, Cu, Zn, Ni, Cr	N
Volatile compounds (VOC)	GC-MS	BTEX, chlorinated aliphatics	N
Semi-volatile compounds (SVOC)	GC-MS	TPH	N
PAH	HPLC	21 PAH	N

Certainly, the compounds, listed in the program are variative, depending on the site production process and possible pollutants.



After the sampling and analysis one should be ready to compare the results with national standards or international requirements (i.e. Dutch values). Further there will be a bit more details on analysis used in Russia given.

### Generic guideline values

Results from chemical analyses from this investigation are compared with both Russian and Dutch generic standards. Russian standards are the primary comparative values for the TIIR site. They are not differentiated with respect to land use. Dutch values are also not differentiated with respect to land use. However, WSP has considered land use when interpreting analytical results.

### Russian standards

Russian standards – as set out in GOST 27593-88 Soils - Terms and definitions, and in GOST 17.4.1.02-83 Environmental Protection - Soils – include two types of generic guideline values:

- **MPC – Maximum Permissible Concentration** of a soil polluting substance. MPC's indicate concentrations which do not cause negative effects, either directly or indirectly, to the natural environment or human health.
- **APC – Approximate Permissible Concentration** of chemical compounds in soil, set by calculation (tentative standard – 3 year validity period). APC values vary depending on soil type: (a) sand and clay sand, (b) acidic soils (loam and clay) with pH<5.5, and (c) neutral soils (loam and clay) with pH>5.5. APC values may in some instances be used instead of MPC values.

For arsenic and heavy metals, reference is also made to the cumulative evaluation of soil contamination. This is done in accordance with 'Methodic recommendations on identification of degraded and contaminated lands' (approved by the Russia land committee 28.12.1994) using the aggregate soil pollution factor  $Z_c$ , as calculated by the following formula:

$$Z_c = K_{C1} + \dots + K_{Ci} + \dots + K_{Cn} - (n-1)$$

where n stands for the number of analyzed components and  $K_{Ci}$  is the concentration ratio of the i:th pollution component (As or heavy metal), i.e. the ratio of the actual concentration of this component in a sample to the "background concentration" of the component. The "background concentration" is calculated as the average of all analyses of any one given component that are deemed to represent background values.

Interpretation of MPC and  $Z_c$  values is normally done in accordance with Table 3-9.

**Table 3-9.** Russian categories of soil pollution.

Categories of pollution	Aggregate soil pollution factor (Zc)	Hazard class <sup>a</sup>						Interpretation for soil use
		1		2		3		
		Organic	Inorganic	Organic	Inorganic	Organic	Inorganic	
Clean	--	> BKGR, ≤ MPC	> BKGR, ≤ MPC	> BKGR, ≤ MPC	> BKGR, ≤ MPC	> BKGR, ≤ MPC	> BKGR, ≤ MPC	No restrictions
Allowed	≤ 16	> MPC, ≤ 2*MPC	> MPC, ≤ 2*MPC	> MPC, ≤ 2*MPC	> MPC, ≤ 2*MPC	> MPC, ≤ 2*MPC	> MPC, ≤ 2*MPC	No restrictions, except for use at high-risk facilities <sup>c</sup>
Prevention regimerate	16-32					> MPC, ≤ 2*MPC	> 2*MPC, ≤ Kmax	May be used under layer of clean soil at least 0.2 m in thickness

Hazardous	32-128	> 2*MPC, ≤ 5*MPC	> 2*MPC, ≤ Kmax <sup>b</sup>	> 2*MPC, ≤ 5*MPC	> 2*MPC, ≤ Kmax	> 5*MCL	> Kmax	May be used under layer of clean soil at least 0.5 m in thickness
Extremely hazardous	> 128	> 5*MCL	> Kmax	> 5*MCL	> Kmax			Must be removed and properly disposed

<sup>a</sup> Hazard class is based on type of chemical contaminant, and includes at least the following compounds:

- 1 Arsenic, cadmium, mercury, lead, zinc, fluorine, 3,4-benzo (a) pyrene
- 2 Boron, cobalt, nickel, molybdenum, copper, antimony, chromium
- 3 Barium, vanadium, tungsten, manganese, strontium.

<sup>b</sup> Kmax = maximum value of allowable levels of a compound based on the four indicators of harmfulness.

<sup>c</sup> E.g. children's and educational institutions, playgrounds, residential buildings, sports and recreation areas, sanitary protection zones for watersheds, coastal zones.

### Dutch standards<sup>18</sup>

In large parts of Europe it is common to use Dutch guideline values when there are no national standards for a given compound in soil. In this report a comparison has also been made with the Dutch guideline values, in particular when no Russian guideline values were available.

The Dutch soil remediation *intervention values* indicate when the functional properties of the soil for humans, plant and animal life, is seriously impaired or threatened. They are representative of the level of contamination above which there is a serious case of soil contamination. Intervention values are related to a spatial scale. For there to be a case of values being exceeded and thus an instance of serious contamination, the average concentration of a minimum of 25 m<sup>3</sup> of the soil volume in the case of earth or sediment contamination, or 100 m<sup>3</sup> pore saturation soil volume in the case of groundwater contamination, must be higher than the intervention value for at least one substance.

The Dutch *target values* indicate the level at which there is a sustainable soil quality. In terms of curative policy this means that the target values indicate the level that has to be achieved to fully recover the functional properties of the soil for humans and plant and animal life. Besides this the target values give an indication of the benchmark for environmental quality in the long term on the assumption of negligible risks to the ecosystem.

According to the Dutch guidelines, concentrations that exceed the target value but do not exceed the intervention value usually suggest either further investigation or that restrictions may be warranted.

### Sampling process:

Soil sampling shall be conducted in the course of well drilling: soil samples shall be taken for determination of heavy metals, TPH, BTEX, PAH and total phenols. Samples are to be packed into polyethylene bags to avoid sample pollution during the transportation, and properly labeled.

Hydrogeological observations should be performed in the process and after drilling. Samples shall be taken after stabilization of water level. Hydrochemical/water samples are used for determination of

<sup>18</sup> Dutch Target and Intervention Values, 2000 (the New Dutch List) (Electronic resource)  
[http://esdat.net/Environmental%20Standards/Dutch/annexS\\_12000Dutch%20Environmental%20Standards.pdf](http://esdat.net/Environmental%20Standards/Dutch/annexS_12000Dutch%20Environmental%20Standards.pdf)

organic compounds (TPH, BTEX, PAH) and heavy metals. Water samples shall be taken after settling by decantation method (drain of clarified water) into the special dark-glass 1 liter bottles with subsequent preserving.

Samples for determination of HM by Atomic absorption analysis/AAA shall be taken into the plastic 250 ml bottles with asap preserving by adding of 5 ml ultra-pure hydrogen nitrate/HNO directly into the container (by disposable syringe). Preserving of water samples for HM shall be performed *in situ*.

All soil and water samples shall be delivered to the laboratory.

### Sampling of topsoil

#### Soil sampling

Collection, preservation, storage, and transportation of soil samples were performed in accordance with the following documents:

- GOST 17.4.3.01-83. Environmental Protection. Soils. General sampling requirements. M.: IPK Izdatel'stvo standartov, 2004;
- GOST 17.4.4.02-84. Environmental Protection. Soils. Methods for collection and preparation of samples for chemical, bacteriological, and helminthological analysis. M.: IPK Izdatel'stvo standartov, 2004;
- Provisional guidelines for soil contamination control methods, M: Gidrometeoizdat, 1983;
- RD 52.18.156-99. Procedural guidelines. Environmental protection. Soils. Methods of composite soil sampling and assessment of farmland contamination with residual pesticides;

and considering recommendations from:

- Requirements for the performance and outputs of multipurpose geochemical mapping 1:200000. M.: IMGRE 2002;
- The sampling will be performed simultaneously with the floristic survey of the area.
- *Identification of sampling areas and establishment of soil profile cuts*
- Sampling areas should be located within a landscape typical of specific parts of the subject area (most of the subject area is occupied by the industrial site)
- Soil profile cuts must be established only in genetically typical topographic points, e.g. on elevations, slopes, in depressions (middle part of a slope, terrace, or high floodplain). Establishment of soil profile cuts near local pollution sources should be avoided, if possible. All details of the location and the soil cut coordinates were entered into the soil sampling report.
- Samples will be collected using the 'envelope' method. The 'envelope' size may vary from 1 to 5 ha for homogeneous soil, or may be reduced to 0.5 ha (~70x70 m) or 20 to 25 m<sup>2</sup> (5x5 m) for non-homogeneous soil and (SP 11-102-97). The standard sample weight is to be approximately 1000 g. The sampling area must be established in order to avoid potential effects of the environment on test results. The area will be photographed.
- The sampling area must be marked on the field work map. A GPS receiver should be used to get coordinates of the central hole.

#### Field processing of soil samples

Single layer or composite soil samples were carefully cleaned of various inclusions, such as pieces of wood, roots and rootlets, stones, litter, etc. Samples were delivered to the laboratory without delay (within the first few days after the sampling) for further treatment (breaking lumps, screening through a 2 mm PETE mesh, quartering to obtain a retention sample.

#### Packing, transportation and storage of soil samples



Soil samples for standard chemical analysis were packed and transported in containers made of chemically neutral material (polyethylene bags). Samples for VOC analysis were placed in glass containers. The samples were delivered to the laboratory in the shortest possible time.

*Equipment and material for establishing soil profile cuts and the taking of samples*

GPS receiver, camera, entrenching shovel, knife or gouge, measuring tape or stick, hydrochloric acid (10%), magnifying glass, stationery (ruler, pencils, eraser, compasses, glue, etc.), bag or knapsack for samples, string, cloth and polyethylene sample bags.

*Water sampling*

The main criterion for identification of sampling points is the exposure to the manmade impact (or the absence of such) and direction of surface runoff.

Collection, preservation, storage, and transportation of water samples are to be performed in accordance with the following documents:

- GOST 17.1.5.04-81. Environmental protection. Hydrosphere. Devices and equipment for collection, primary processing and storage of natural water samples. General specification. M.: IPK Izdatel'stvo standartov, 2003;
- GOST 17.1.3.07-82. Environmental protection. Hydrosphere. Procedures for testing water quality in water bodies and watercourses. M.: IPK Izdatel'stvo standartov, 2001;
- GOST 17.1.5.05-85. Environmental protection. Hydrosphere. General requirements for the sampling of surface (inland) and marine water, ice, and precipitation. M.: IPK Izdatel'stvo standartov, 2003;
- GOST R 51593-2000. Drinking water. Sampling. M.: Standartinform, 2008;

and considering the recommendations from:

- Requirements for the performance and outputs of multipurpose geochemical mapping 1:200000. M.: IMGRE 2002;

*Water sampling*

Samples of surface water were taken from the watercourses of the subject area

Samples for analysis of saturated hydrocarbons were collected in glass containers (1 litre) which were fully filled with water without air bubbles and sealed with a Teflon cap. Water samples for chemical composition and metal content analysis were collected in plastic containers 0.05 litre and 1 litre.

The storage period of samples for bacteriological analysis should not exceed the limits established in GOST R 51593-2000.

The duration of water storage was recorded in the test report.

*Field processing of samples*

Water temperature, colour, turbidity and pH value were determined in the field. Samples were conserved and prepared for transportation in accordance with the required analytical procedures.

*Equipment and material for water sampling:*

- container for chemicals;
- boxes for storage and transportation of samples;
- 1 litre borosilicate glass bottle with airtight screw cap for taking samples for Hg;
- 3 glass bottles (1 litre each) for samples for organic parameters analysis;
- dense polyethylene container 0.05 l for samples for analysis of cations and microelements;
- bag or knapsack for samples;
- filters (membrane filters with pore size of 0.45 µm);
- filtering pump; and
- water-tester for the temperature and pH analysis.

### Sampling of bottom sediments

Samples of bottom sediments (BS) are taken for pollution analysis in accordance with GOST 17.1.5.01-80 (Environmental Protection. Hydrosphere. General requirements for the sampling of bottom sediments from water bodies for pollution analysis. M.: IPK Izdatel'stvo standartov, 2002) in order to outline the area of spreading of individual pollutants, identify sources of secondary pollution and the level of manmade contribution to geochemical conditions of river channels. This enabled an integrated and objective assessment of the current geochemical and hydrochemical conditions of the watercourse catchment within the area of influence of the project facilities.

#### *Identification of sampling stations and the sampling process*

The identification of bottom sediment sampling stations and the sampling process were in accordance with GOST 17.1.3.07-82. Samples of bottom sediments were taken from the same locations as water samples. Bottom sediment samples are taken from the channels of watercourses.

The BS sampling procedure was determined by the type and order of the watercourse. For watercourses of high orders preferable sampling methods are (in the order of preference):

- sampling of spring flood sediment which usually occurs as 'medallions' (patches) 0.2 m to 1 m above the waterline;
- sampling of river sediment accumulated in ribbons along the waterline, concentrations in water holes, on boulders and flotsam;
- samples of bottom sediments are extracted using a bucket or a plastic scoop (if sampling conditions are favourable), or by hand.

At least 300-500 grams of unscreened silt is required to obtain a representative bottom sediment sample (at least 100 g). Visual assessment of silt grain size and sample weight is usually not associated with any difficulty.

Samples were loaded in pouches of dense material which were then placed in a polyethylene bag.

#### *Equipment and material for sampling bottom sediments (alluvial deposits)*

Shovel, plastic scraper or a small scoop, bag or knapsack for samples, string, cloth and polyethylene sample bags (food grade), sealable polyethylene containers for sample analysis for mercury.

### Air sampling

Samples were taken in accordance with the requirements of:

- GOST 17.2.4.02-81. Environmental protection, Atmosphere. General requirements for pollutant determination methods. M.: IPK Izdatel'stvo standartov, 2004;
- GOST 17.2.6.02-85. Environmental protection, Atmosphere. Gas analysers for air pollution control. General specifications. M.: IPK Izdatel'stvo standartov, 1998;
- RD 52.04.186.89. Guidelines for air pollution control. M.: Minzdrav SSSR, 1991.

Monitoring posts were located in open areas outside of any wind shadow and away from the running equipment. Air temperature and weather conditions were reported simultaneously with air sampling.

Air sampling may be carried out using i.e. the GANK-4 portable gas analyser.

The analyser utilises (depending on the substances being controlled) several principles of operation, such as optron photometric, thermocatalytic, electrochemical, sorption, or solid electrolytic. Levels of air pollutants (NO<sub>2</sub>, SO<sub>2</sub>, CO, total saturated hydrocarbons, soot, PM) were measured using dry reactive tapes, electrochemical/ thermocatalytic or semiconductor sensors. Operation of the gas analyser is automatic. Air is sucked in by a pump through an intake nipple onto the sensor or chemical cartridge tape. After the maximum of 20 seconds (if measured by a sensor) or 30 seconds (if measured in a chemical cartridge) the signal is

received by a computing device which converts it and displays the current concentration on the LCD in mg/m<sup>3</sup>. The air temperature and atmospheric pressure were measured by inbuilt sensors of GANK-4.

#### Groundwater sampling

Samples of seasonal thaw groundwater were taken from wells and test holes after the bailing or pumping of double the volume of the well (hole) and recovery of the level. Well casing was not performed. The sampling was carried out in compliance with the requirements of GOST R 51592-2000 and GOST 17.1.3.06-82. The temperature and pH value of seasonal thaw groundwater were determined insitu using the pocket watertight pH/temperature tester (HI 98127).

### **Analytical works Analytical techniques for different soil pollutant**

Pollutants in soil samples were determined following the procedures provided by the Gosstandart Register as well as US EPA techniques.

#### **Soil**

##### ***Microelements***

Elemental composition of soil is be determined using the method of Mass Spectrometry with Inductively Coupled Plasma (ICP-MS).

May use a sensitive ICP-MS instrument with an ELEMENT 2 magnetic sector (Finnigan MAT, Germany), capable of dual focusing and signal recording in various Decrees: Low Decree (LR)-300, Medium Decree (MR) - 4000, and High Decree (HR) - 10000 M/ΔM. Operating conditions is standard. An internal standard - Rh with end concentration of 2 ng/mL is used to level out any possible matrix effect and to handle signal instability or fluctuations during the spectra acquisition procedure. Spectral interference is reduced by selecting analytical isotopes, free of superimposed foreign masses. In addition, spectra are recorded at medium Decree (MR), which allow us to segregate the masses of superimposed compounds. Multi-elemental certified solutions (CLMS-2, SPEX, U.S.) use for calibration purposes in the evaluations of microcomponent content (V, Mn, Fe, Ni, Cu, Zn, Cd, Ba, and Pb) in the sample, while GSO (State Standard Sample) solutions of the Urals Plant of Chemical Reactants (Yekaterinburg) and GSO solutions of the Central Institute for Water Quality, Saint Petersburg, Russia is used for the same purposes for macrocomponent analysis (Na, Mg, K, and Ca). All types of solutions (flushing solutions, dummy solutions, calibration solutions, and reference solutions IQC-026) is prepared using water, treated in the Millipore-ELIX-3 vessel (Millipore SA, France).

##### ***Mercury***

The measurement method for mass percentage of total mercury in soil and ground samples is based upon atomization of the mercury contained in the sample in a two-piece attachment pyrolysis reactor RP-91S and subsequent determination using the flameless absorption method on a RA-915+ mercury analyzer. Weight percentage of mercury in the sample is determined on the basis of an integral analytical signal, applying the calibration factor previously established.

##### ***Detection of TPH (Oil products) in soil samples***

Common principle of all methods is extraction of the sum of non polar and few polar hydrocarbons from the sample by organic solvent and definition of their concentration in solution with preliminary eluates purification or without it. Methodology of oil products definition in soils and grounds is based

on extraction of oil products by tetrachlorated carbon with subsequent eluates purification on aluminum oxide in column. Concentration of hydrocarbons in sample is defined by infrared spectrometric method (ISM).

ISM method is based on the change of C-H-links: methene –  $\text{CH}_2$  and methyl –  $\text{CH}_3$  groups in area of  $2700\text{--}3100\text{ cm}^{-1}$ . Quantitative definition of oil products is done by calibrating charts, on the basis of forced hydrocarbons mixture.

TPH extraction from soil samples and eluate purification from inclusion of polar hydrocarbons are done simultaneously in chromatographic column. The following should be prepared for this purpose: glass column, cotton wool tampon, sorbet ( $\text{Al}_2\text{O}_3$ ), watered by solvent  $\text{CCl}_4$ , then a weight of the sample is added with same solvent at the top. Extraction process is done under room temperature with flowing of eluate out in a glass with velocity  $0.1\text{--}0.2\text{ ml/min}$ . As far as solvent is spent, new portions are added. Sufficient level of eluate for extraction of oil products from the soil with different concentration level is given in the table, where the optimal conditions of extraction are listed. Eluate volume used during infra red spectroscopic method is measured.

For gage curve drawing a mixture of isooctane and benzene is used as a standard solution. Produced mixture is diluted in  $\text{CCl}_4$  in measuring flask. Produced solutions are used as standard / main solutions. Two series of standard solutions are prepared in series by dilution of main solutions.

One dish is filled with  $\text{CCl}_4$ , preliminary propagated through the column with aluminum oxide (comparison dish), another with investigated solution. Intensity of absorption is measured on infra red spectrometer at interval of wave length  $2700\text{--}3100\text{ cm}^{-1}$ . Optical density is calculated by the basis line method. Measurement will be performed at KN-2 device.

ISM method measurements are conducted according to RD 52.18.585–96. Accuracy of PTH detection accounts for 21 % within the range of concentrations 25 - 90 mg/kg and 7 % within the range 91 – 950 mg/kg.

Gravimetric measurements is be conducted according to RD 52.18.647–2003 (balance VLR – 200). Accuracy of PTH detection accounts for 45 % within the range of 25 - 50 000 mg/kg and 35 %, within the range 50 001 – 500 000 mg/kg.

### ***Polyaromatic Hydrocarbons (PAH)***

In order to use the liquid chromatography method to determine PAH, evaporate the entire hexane extraction or its aliquot part at room temperature, cleanse with 2 mL of acetonitrile, grade "OSCh F-200 nm", and transfer into vials. Chromatograph ACN-extractions on a Lab Alliance liquid chromatograph with analytical column  $4\times 150\text{ mm}$  with Diasphere–110- $\text{C}_{16}$  sorbent.

Divide in a gradient or isocratic prevention regime by elution with acetonitrile or mix of acetonitrile and water at an eluent rate of  $0.5\text{ mL/min}$ . Detect at  $\lambda_{\text{excit}} = 254\text{ nm}$  and  $\lambda_{\text{reg}} = 450\text{ nm}$  at room temperature.

We will use acetonitrile F-200 nm, grade "OSCh", for chromatography on a VZhKh instrument (High-Performance Liquid Chromatograph) as per TU-6-09-14-2167-84 Russian National Technical Specifications. Determine PAH mass using the external standard method and the addition method.

Calibration of chromatograph is performed by PAH solution in acetonitril made by «Ekros» (COPER-PAH 1-13).

### **PCBs**

Soils samples for PCB detection are analyzed according to RD 52.18.578-97 “Methodical guidelines. Mass portion of PCB isomer sum in soils. Methods for measurements using gas-liquid chromatography”.

PCBs are extracted with acetone and hexane mixture. An aliquot of air-dried soil (10 g) is moistened with distilled water. After 22-28 hours the moistened soil is extracted with 40 cm<sup>3</sup> of hexane and 10 cm<sup>3</sup> of acetone mix during 1 hour with subsequent centrifuging.

Extracts are dehydrated by filtration and concentrated to the volume of 4-5 cm<sup>3</sup>. Then the extract is cleaned with concentrated H<sub>2</sub>SO<sub>4</sub>, and after double washing with 0,5% sodium bicarbonate solution and distilled water, extract is dehydrated by filtration and evaporation in the air blast at room temperature to the volume of 1-2 ml.

Chromatography analysis of the aliquot of the cleaned extract is conducted at Cvet-500M device. Separation is done at 2 m long capillary tube with inner diameter 3 mm, filled with Chromaton N-AW-DMCS 0.16-0,20 mm with 5% of applied liquid phase XE-60.

Identification will be confirmed by retention time of PCB congeners according to 8082 EPA method.

### **Phenols**

Phenols in soil are detected as follows: 30 ml of distilled water is added to 10 g of soil, 30 ml of butyl acetate, 0,5 ml HCl (1:1), 1g NaCl and extracted for 30 minutes (at pH <2).

After the settling and water separation 30 ml of BA extraction is obtained.

For re-extraction 50 ml of 1n solution of NaOH is pulled to the extraction; after shaking during 3 min lower alkaline layer is pulled into the second separating funnel; obtained extraction is used for detection of optical density.

Detection of optical density is conducted at 490 nm wavelength (3 cm cell; 0.2-0.5 g of anhydrous salt cake is added to BA-extraction prior to detection).

Re-extraction is conducted according to RD 52.24.480-95 MU.

### **Volatile Organic Matter (Compound)**

The procedure of the vapor phase analysis of BTEX in soil and bottom sediment samples is as follows. Place 3 g of soil from a wet sample in a penicillin flask. Add 1 mL of water and tightly close the lid. Keep the flask at 70°C for 30 minutes with an error of +0.2°C until equilibrium distribution of the substance between phases. After that, enter 1 mL of gas phase of the sample in the chromatograph evaporator.

Gas samples are analyzed on a Crystal-2000M gas chromatograph with two parallel detectors, FID and PID, the ratio of flows between which is 1 : 1. The mix is divided on a Zebron capillary column (ZB-WAX). The column is 30 meters long, 0.32 mm OD, 0.5 µm ID. The detector temperature is 200°C. The evaporator temperature is 200°C. The column temperature is 50°C. The hydrogen flow rate is 20 cm<sup>3</sup>/min. The air flow rate is 200 cm<sup>3</sup>/min. The nitrogen flow rate is 40 cm<sup>3</sup>/min.

The minimum measurable content of BTEX in soil and bottom sediment samples is 0.001 mg/kg. The assigned characteristic error of BTEX analysis in the samples is ± 25% at a confidence probability of 0.95.



---

## **Water**

### ***Parameters to Be Determined in the Field (T, pH)***

The following parameters of water are determined in water samples during the field survey directly at observation stations: organoleptic indicators of water (such as colority, turbidity, odor), temperature (Twtr), pH.

Measurements of Twtr, pH is taken using a "four in one" portable measurement instrument - Water Test of Hanna Instruments, Germany. This instrument allows the researchers to measure pH in the full range from 0 to 14, and temperature from 0 to 60°C

### ***Microelements***

Elemental composition of water is determined using the method of Mass Spectrometry with Inductively Coupled Plasma (ICP-MS). The governing document for the analysis and determination of metrological characteristics was Category III Accuracy Industry Procedure (Procedure No. 480-Kh), approved by Federal Scientific Methodical Center of Laboratory Studies and Certification of Raw Minerals at VIMS in 2002.

### ***Mercury***

The method to measure mass concentration of total mercury in water samples is based upon reduction of mercury cations to atomic condition with tin dichloride solution (the "Cold Vapor" method) and upon measurement of optical density in a cuvette of the RA-915+ mercury analyzer (Procedure for Measurements of Mass Concentration of Total Mercury in Samples of Natural, Potable, and Waste Water Using the "Cold Vapor" Method on an RA-915+ Mercury Analyzer with an RP-91 Attachment. PNDF 14.1:2:4.160-2000. Moscow, 2000).

### ***Total petroleum hydrocarbons (TPH)***

The following procedures is used to extract TPH. Transfer a 0.8–1.0 dm<sup>3</sup> unfiltered water sample from a transport container into a 1 dm<sup>3</sup> separating column. Twice rinse the transport container with 10 cm<sup>3</sup> of CCl<sub>4</sub> in each case and transfer the drains into a separating funnel. Add 20 cm<sup>3</sup> of CCl<sub>4</sub> into the separating funnel and do the extraction, shaking the sample for 3 minutes and then wait for stratification of the mix for 15–30 minutes. Then transfer the water phase into a chemical beaker, and the hexane extraction into a flask with a sealing plug. Return the water sample into the separating funnel and once again extract with 20 cm<sup>3</sup> of CCl<sub>4</sub>. After stratification, discard the water sample, and combine the hexane extraction with the first extraction.

### ***Polyaromatic Hydrocarbons (PAH)***

For extraction of PAH water sample (1,0 dm<sup>3</sup>) is filtered through the blue ribbon, weighted in advance; filter is dried and packed into the paper bag. For detection of the slip of water soluble PAH, filtrate is pulled into the separating funnel, add 20 cm<sup>3</sup> of n-hexane and do the extraction, shaking the sample for 15 minutes. After stratification extraction is separated into a flask with a sealing plug. Filtered portion is once again extracted with 20 cm<sup>3</sup> of n-hexane. New portion of extraction is combined with the first extraction.

Extractions are placed in dark glass ware with a sealing plug.

### ***Volatile Organic Matter***

The volatile organic matter (BTEX) substances that are determined in water samples are benzene,

toluene, ethylbenzene, and xylenes. The procedure of the vapor phase analysis of BTEX in water samples is as follows. Place 5 cm<sup>3</sup> of water in a penicillin flask. Add 2 g of sodium sulfate and tightly close the lid. Keep the flask at 50°C for 30 minutes with an error of +0.2°C until equilibrium distribution of the substance between phases. Then enter 1 mL of gas phase of the sample in the chromatograph evaporator.

The minimum measurable content of BTEX in water samples is 0.005 mg/dm<sup>3</sup>.



---

## Conclusion

You got general impression on state of HSE in Russian Federation. Please note that all national documentation is in Russian – national language (as well as National legislation in different countries are in local languages). So this means that willing to work in certain country is good to know also local language in addition to international language, which is English now.

One more aspect which one should have in mind after completion of this course is changing National and international legislation – prior to insisting on certain point, please check the latest version of law where it is mentioned – it can be that just yesterday smth changed and you did not know yet.

Please take time to make Yourself familiar with updated legal requirements prior to start managerial activities or perform an audit.

Authors wish all the best in advancing HSE aspects in practice.

**Literature**

1. Environmental Health and Safety Audits, 9th edition/ Lawrence B. Cahill with Raymond W. Kane/ Rowman & Littlefield, 2011, 686 p.
2. Golovacheva I.V., Pinaev V.E. Training in environmental, occupational, industrial and fire safety management at the university, summer school, organization // RUDN Journal of Ecology and Life Safety. - 2021. - Vol. 29. - N. 3. - P. 277-281. doi: 10.22363/2313-2310-2021-29-3-277-281
3. Ledashcheva T.N., Pinaev V.E. Environmental baseline assessment - changes 2022 // RUDN Journal of Ecology and Life Safety. - 2021. - Vol. 29. - N. 4. - P. 381-385. doi: 10.22363/2313-2310-2021-29-4-381-385
4. Ledashcheva T.N., Pinaev V.E. Environmental disciplines taught to foreign students participating short term exchange programs in RUDN University: experience and approach // RUDN Journal of Ecology and Life Safety. - 2021. - Vol. 29. - N. 2. - P. 204-208. doi: 10.22363/2313-2310-2021-29-2-204-208
5. Pinaev V.E. Modelling of Natural Attenuation of Chlorinated Solvents constituents Of Emplaced Source in Virtual Aquifer (монография) / LAP Lambert Academic Publishing, 2010, ISBN 978-3-8383-5233-6
6. Pinaev V.E., Ledashcheva T.N. Environmental impact fee calculation in Russia for EIA – modern practices. Учебное пособие – М.: Мир науки, 2019. – Режим доступа: <https://izd-mn.com/PDF/20MNNPU19.pdf> — Загл. с экрана. ISBN 978-5-6042807-1-3
7. Афанасьева О.О., Касимов Д.В., Пинаев В.Е. Вопросы рекультивации земель – опыт подготовки главы для Проекта мероприятий по охране окружающей среды (статья) // Интернет-журнал «Мир Науки» Выпуск 1 (7) 2015 (январь – февраль - март) ISSN 2309-4265 режим доступа Интернет-журнал <http://mir-nauki.com/PDF/13EMN115.pdf>
8. Афанасьева О.О., Касимов Д.В., Пинаев В.Е. Раздел МООС проектной документации для трубопровода: мероприятия по охране и рациональному использованию земельных ресурсов и почвенного покрова // Журнал «Справочник Эколога». 2015. № 3 (27). Март. С. 54–59.
9. Афанасьева О.О., Пинаев В.Е. Воздействие на морские воды при бурении скважин с морской платформы – опыт подготовки раздела проектной документации // Интернет-журнал «Наукovedenie» (учредитель журнала НОУ ВПО ИГУПИТ). 2014. № 6 (25). Ноябрь–декабрь. URL: <http://naukovedenie.ru/PDF/110EVN614.pdf>.
10. Балабанов В.А. Теоретические основы разработки и использования учебно-методического комплекса дисциплины «Основы первой помощи» // Журнал «Историческая социально-образовательная мысль» том 7 № 4 2015 с. 119-122
11. Безноздрева Е.А., Воробьев Д.С., Емельянова Л.Г., Землянова О.И., Каргашина М.А., Касимов Д.В., Кривонос Е.В., Михеева А.И., Пинаев В.Е., Протопопов Н.Ф., Резников И.С., Рукавицын В.В., Рыбкина Г.И., Скворцова Е.А., Сосновских С.Л., Сысоева И.А., Хуршудов А.Г., Шахин Д.А., Якунин С.А. Сборник инновационных решений по сохранению биоразнообразия для нефтедобывающего сектора: монография. М.: ООО «РА ИЛЬФ», 2015. – 275 с.
12. Бобылев С.Н., Кудрявцева О.В., Соловьева С.В., Ситкина К.С. Индикаторы экологически устойчивого развития для регионов России: коллективная монография. М.: ИНФРА-М, 2015.-194 с.
13. Газета «Русскія Вѣдомости» от 13 февраля 1894 г. № 44, стр. 2 / отдел газет Российской государственной библиотеки
14. Головачева И.В., Пинаев В.Е. Обучение вопросам управления охраной окружающей среды и труда, промышленной и пожарной безопасностью в университете, летней школе, организации // Вестник Российского университета дружбы народов. Серия: Экология и безопасность жизнедеятельности. - 2021. - Т. 29. - №3. - С. 277-281. doi: 10.22363/2313-2310-2021-29-3-277-281

15. Горелов В.И., Ледащева Т.Н., Пинаев В.Е. Когнитивное моделирование планируемых и действующих предприятий с использованием данных ИЭИ, ОВОС и аудита // Управление развитием крупномасштабных систем (MLSD'2012). Шестая международная конференция, 1–3 окт. 2012 г., Москва. – Труды в 2 т. М.: ИПУ РАН, 2012. – Т. II. – С. 130–138. ISBN 978-5-91450-119-5(Т. II).
16. Горелов В.И., Ледащева Т.Н., Пинаев В.Е. Когнитивное моделирование планируемых и действующих предприятий с использованием данных ИЭИ, ОВОС и аудита (статья) / Управление развитием крупномасштабных систем (MLSD'2012). Шестая международная конференция, 1-3 окт.2012 г., Москва. – Труды: в 2 томах М.: ИПУ РАН 2012 – Т. II - с.130-138 ISBN 978-5-91450-119-5(Т. II)
17. Касимов Д.В., Пинаев В.Е. Особенности учета ущерба от воздействия на грибы и некоторые компоненты растительного мира // Интернет-журнал «НАУКОВЕДЕНИЕ». 2015. Т. 7. № 5. URL: <http://naukovedenie.ru/PDF/01EVN515.pdf> (доступ свободный). Загл. с экрана. Яз. рус., англ.
18. Касимов Д.В., Пинаев В.Е. Оценка воздействия на почвенно-растительный покров – практика проведения при оценке воздействия на окружающую среду // Интернет-журнал «Науковедение» (учредитель журнала НОУ ВПО ИГУПИТ). 2014. № 6 (25). Ноябрь–декабрь. URL: <http://naukovedenie.ru/PDF/121EVN614.pdf>
19. Касимов Д.В., Пинаев В.Е. Оценка воздействия на растительный покров: расчет ущерба или пересадка // Интернет-журнал «НАУКОВЕДЕНИЕ». 2015. Т. 7. № 4. URL: <http://naukovedenie.ru/PDF/104EVN415.pdf> (доступ свободный). Загл. с экрана. Яз. рус., англ.
20. Касимов Д.В., Пинаев В.Е. Теория и практика расчета и минимизации ущерба лесным ресурсам: редким видам растений, древесным и пищевым ресурсам, лекарственному сырью: монография. М.: Мир науки, 2015. – 95 с. URL: <http://izd-mn.com/opublikovannyye-izdaniya.html> (доступ свободный). Загл. с экрана. Яз. рус.
21. Кривонос Е.В., Пинаев В.Е. Социально-экологическая оценка проектов и участие общественности. Мировой и отечественный опыт // Региональная наука: Десятая международная научная конференция молодых ученых 30 октября 2009 г. / Сборник научных трудов. М.: ЛЕНАНД, 2009. – 576 с. (С. 394–403).
22. Кудрявцева О.В, Папенков К.В. Экономика природопользования и охраны окружающей среды ТЕИС Москва, ISBN 978-5-7218-1174-6, 174 с.
23. Кудрявцева О.В. Основы экологического аудита//Вестник Московского университета. Серия 6. Экономика. -2000. -№ 4
24. Кудрявцева О.В. Экологический аудит. М.: ТЕИС, 2000. – 62 с.
25. Кудрявцева О.В. Экологический аудит. М.: Экономический ф-т МГУ, ТЕИС, 2000. 62 с.
26. Кудрявцева О.В., Ледащева Т.Н., Пинаев В.Е. Особенности исчисления платы за загрязнение окружающей среды в России (статья) / «Вестник Университета» теоретический и научно-методический ж-л М., ГУУ, 2013, ISSN 1816-4277. 2013, № 21 с. 153-161
27. Кудрявцева О.В., Ледащева Т.Н., Пинаев В.Е. Особенности исчисления платы за загрязнение окружающей среды в Российской Федерации (статья) // Журнал «Справочник Эколога» № 5 (17) май 2014 М., стр. 61-68
28. Кудрявцева О.В., Ледащева Т.Н., Пинаев В.Е. Развитие экологического аудита в России (статья) / Журнал «Государственный надзор» № 3 (15) 2014 г. Екатеринбург, стр. 201-203
29. Кудрявцева О.В., Папенков К.В. Экономика природопользования и охраны окружающей среды. М.: ТЕИС, 2010. – 174 с.
30. Кудрявцева О.В., Пинаев В.Е., Ледащева Т.Н. Развитие экологического аудита в России // Государственный надзор. 2014. Т. 15. № 3. С. 201–203.

31. Кудрявцева О.В., Пинаев В.Е., Чернышев Д.А. История, становление и современное состояние экологического аудита в РФ // Экономика природопользования. ВИНТИ. 2014. № 4. С. 59–66.
32. Кудрявцева О.В., Пинаев В.Е., Чернышев Д.А. История, становление и современное состояние экологического аудита в РФ (статья) / Журнал «Экономика природопользования» Номер: 4 Год: 2014 Страницы: 59-66.
33. Ледащева Т.Н., Пинаев В.Е. Элементы учебно-методического комплекса по дисциплине «Экологический аудит» (статья) / Интернет-журнал «Мир Науки» Выпуск 4 (6) 2014 (октябрь — декабрь) ISSN 2309-4265 режим доступа <http://mir-nauki.com/PDF/07PMN414.pdf>
34. Ледащева Т.Н., Пинаев В.Е. HSE-аудит - практика и тенденции в РФ (статья) / Актуальные проблемы экологии и охраны труда: сборник статей IV Международной научно-практической конференции. Юго-Зап. гос. ун-т. Курск. 2012 - 336 с. (с.156-158) ISBN 978-5-7681-0726-0
35. Ледащева Т.Н., Пинаев В.Е. Обучение экологическим дисциплинам иностранных студентов, приехавших по краткосрочным обменным программам: опыт и подходы РУДН // Вестник Российского университета дружбы народов. Серия: Экология и безопасность жизнедеятельности. - 2021. - Т. 29. - №2. - С. 204-208. doi: 10.22363/2313-2310-2021-29-2-204-208
36. Ледащева Т.Н., Пинаев В.Е. Опыт развития системного мышления у студентов-экологов в рамках курса экоинформатики (статья) / «Вестник РУДН» Серия Экология и безопасность жизнедеятельности: научный ж-л. № 4, 2011, (с.97-101) ISSN 0869-8732
37. Ледащева Т.Н., Пинаев В.Е. Оценка современного состояния окружающей среды - изменения 2022 // Вестник Российского университета дружбы народов. Серия: Экология и безопасность жизнедеятельности. - 2021. - Т. 29. - №4. - С. 381-385. doi: 10.22363/2313-2310-2021-29-4-381-385
38. Ледащева Т.Н., Пинаев В.Е. Применение математического моделирования при учете социо-эколого-экономических факторов в проектном цикле (статья) // Интернет-журнал «Наукovedение» (учредитель журнала НОУ ВПО ИГУПИТ) № 2 (21) выпуск март-апрель 2014 режим доступа <http://naukovedenie.ru/PDF/117EVN214.pdf> ISSN 2223-5167
39. Ледащева Т.Н., Пинаев В.Е. Развитие «зеленой экономики» и стратегическая экологическая оценка // Интернет-журнал «Наукovedение» (учредитель журнала НОУ ВПО ИГУПИТ). 2014. № 1 (20). Январь–февраль. URL: <http://naukovedenie.ru/PDF/64EVN114.pdf>
40. Ледащева Т.Н., Пинаев В.Е. Расчет платы за загрязнение компонентов окружающей среды – изменения законодательства (статья) // Интернет-журнал «НАУКОВЕДЕНИЕ» Том 8, № 6 (2016) <http://naukovedenie.ru/PDF/03EVN616.pdf> (доступ свободный). Загл. с экрана. Яз. рус., англ.
41. Ледащева Т.Н., Пинаев В.Е. Элементы учебно-методического комплекса по экологии для церковных учебных заведений // Интернет-журнал «Мир Науки» Выпуск 1 (3) 2014 (январь — март) режим доступа <http://mir-nauki.com/PDF/10PMN114.pdf>
42. Луговая Е.А., Пинаев В.Е. Особенности современной практики экологического сопровождения проектов бурения морских поисковых скважин // Вестник Университета. 2013. № 14. С. 129–132.
43. Пинаев В.Е. Касимов Д.В. Оценка воздействия на почвенно-растительный покров – практика проведения при оценке воздействия на окружающую среду (статья) // Интернет-журнал «Наукovedение» (учредитель журнала НОУ ВПО ИГУПИТ) № 6 (25) выпуск ноябрь-декабрь 2014 режим доступа <https://naukovedenie.ru/PDF/121EVN614.pdf>
44. Пинаев В.Е. Ключевые аспекты подготовки раздела по экологическому мониторингу для государственной экологической экспертизы (статья) // Интернет-журнал

- «НАУКОВЕДЕНИЕ» Том 8, №5 (2016) <http://naukovedenie.ru/PDF/01EVN516.pdf> (доступ свободный). Загл. с экрана. Яз. рус., англ.
45. Пинаев В.Е. Ледашева Т.Н. Расчет платы за загрязнение компонентов окружающей среды: что изменилось? (статья) // Журнал «Справочник Эколога» № 2 (50) февраль 2017 М., стр. 54-59
46. Пинаев В.Е. Моделирование системы оценки проектов нефтегазовой отрасли на примере Ямало-Ненецкого автономного округа (статья) // Интернет-журнал «НАУКОВЕДЕНИЕ» Том 8, №4 (2016) <http://naukovedenie.ru/PDF/51EVN416.pdf> (доступ свободный). Загл. с экрана. Яз. рус., англ.
47. Пинаев В.Е. Обзор зарубежных публикаций по экологическому аудиту (статья) // Интернет-журнал «Отходы и ресурсы» Том 3, №4 (2016) <http://resources.today/PDF/01RRO416.pdf> (доступ свободный). Загл. с экрана. Яз. рус., англ.
48. Пинаев В.Е. Обзор российских публикаций по экологическому аудиту (статья) // Интернет-журнал «Отходы и ресурсы» Том 4, №1 (2017) <http://resources.today/PDF/02RRO117.pdf> (доступ свободный). Загл. с экрана. Яз. рус., англ. DOI: 10.15862/02RRO117
49. Пинаев В.Е. Обзор современной практики проведения стратегической экологической оценки за рубежом (статья) // Интернет-журнал «НАУКОВЕДЕНИЕ» Том 8, № 6 (2016) <http://naukovedenie.ru/PDF/02EVN616.pdf> (доступ свободный). Загл. с экрана. Яз. рус., англ.
50. Пинаев В.Е. Расчет платы за размещение отходов в России – современная практика // Интернет-журнал «Отходы и ресурсы» Том 3, №3 (2016) <http://resources.today/PDF/01RRO316.pdf> (доступ свободный). Загл. с экрана. Яз. рус., англ.
51. Пинаев В.Е. Учет социо-эколого-экономических факторов в проектном цикле – современная практика (монография) // М.: Мир науки, 2016. - 187 с. ISBN 978-5-9907958-5-3 <http://izd-mn.com/PDF/14MNNPM16.pdf> (доступ свободный). Загл. с экрана. Яз. рус.
52. Пинаев В.Е. Экологический аудит – вопросы обращения с отходами производства и потребления (статья) // Интернет-журнал «Отходы и ресурсы» Том 3, №3 (2016) <http://resources.today/PDF/02RRO316.pdf> (доступ свободный). Загл. с экрана. Яз. рус., англ.
53. Пинаев В.Е. Экологический аудит в Российской Федерации – современные реалии (статья) // Интернет-журнал «НАУКОВЕДЕНИЕ» Том 8, №5 (2016) <http://naukovedenie.ru/PDF/06EVN516.pdf> (доступ свободный). Загл. с экрана. Яз. рус., англ.
54. Пинаев В.Е. Эколого-экономическая эффективность утилизации промышленных твердых отходов: монография. М.: ТЕИС, 2005. – 174 с.
55. Пинаев В.Е. Эколого-экономическое моделирование предприятий (статья) / «Вестник МГУ» серия 6, экономика: научный ж-л – М., МГУ, 2013.- ISSN 0201-7385. 2013, № 3 май - июнь. с. 54-63.
56. Пинаев В.Е., Афанасьева О.О. Воздействие на морские воды при бурении скважин с морской платформы – опыт подготовки раздела проектной документации (статья) // Интернет-журнал «Науковедение» (учредитель журнала НОУ ВПО ИГУПИТ) № 6 (25) выпуск ноябрь - декабрь 2014 режим доступа <http://naukovedenie.ru/PDF/110EVN614.pdf>
57. Пинаев В.Е., Безноздрова Е.А., Воробьев Д.С., Емельянова Л.Г., Землягнова О.И., Каргашина М.А., Касимов Д.В., Кривонос Е.В., Михеева А.И., Протопопов Н.Ф., Резников И.С., Рукавицын В.В., Рыбкина Г.И., Скворцова Е.А., Сосновских С.Л., Сысоева И.А., Хуршудов А.Г., Шахин Д.А., Якунин С.А. Сборник инновационных решений по сохранению биоразнообразия для нефтедобывающего сектора



- (монография) // М.: изд. ООО «РА ИЛЬФ», 2015. - 275 с. <http://bd-energy.ru/art.php?lan=ru&id=140> (доступ свободный). Загл. с экрана. Яз. рус. 27,9 п.л. / 1,46 п.л
58. Пинаев В.Е., Касимов Д.В. Вопросы рекультивации земель, пресноводных и морских объектов: монография – М.: Мир науки, 2017.– URL: <http://izdmn.com/PDF/10MNNPM17.pdf> – Загл. с экрана.
59. Пинаев В.Е., Касимов Д.В. Вопросы рекультивации земель, пресноводных и морских объектов (монография) // М.: Мир науки, 2017.– Режим доступа: <http://izdmn.com/PDF/10MNNPM17.pdf> – Загл. с экрана. ISBN 978-5-9908913-5-7
60. Пинаев В.Е., Касимов Д.В. Особенности учета ущерба от воздействия на грибы и некоторые компоненты растительного мира (статья) // Интернет-журнал «НАУКОВЕДЕНИЕ» Том 7, №5 (2015) <http://naukovedenie.ru/PDF/01EVN515.pdf> (доступ свободный). Загл. с экрана. Яз. рус., англ. DOI: 10.15862/01EVN515
61. Пинаев В.Е., Касимов Д.В. Оценка воздействия на растительные ресурсы, занесенные в Красную книгу, в проектной документации (статья) // Интернет-журнал «Отходы и ресурсы» Том 3, №4 (2016) <http://resources.today/PDF/02RRO416.pdf> (доступ свободный). Загл. с экрана. Яз. рус., англ.
62. Пинаев В.Е., Касимов Д.В. Оценка воздействия на растительный покров: расчет ущерба или пересадка (статья) // Интернет-журнал «НАУКОВЕДЕНИЕ» Том 7, №4 (2015) <http://naukovedenie.ru/PDF/104EVN415.pdf> (доступ свободный). Загл. с экрана. Яз. рус., англ. DOI: 10.15862/104EVN415
63. Пинаев В.Е., Касимов Д.В. Расчет ущерба при пересадке краснокнижных растений (статья) // Журнал «Справочник Эколога» № 3 (51) март 2017 М., стр. 54-59
64. Пинаев В.Е., Касимов Д.В. Рекультивация - водные объекты и суша (статья) // Интернет-журнал «НАУКОВЕДЕНИЕ» Том 9, №2 (2017) <http://naukovedenie.ru/PDF/13EVN217.pdf> (доступ свободный). Загл. с экрана. Яз. рус., англ.
65. Пинаев В.Е., Касимов Д.В. Теория и практика расчета и минимизации ущерба лесным ресурсам: редким видам растений, древесным и пищевым ресурсам, лекарственному сырью (монография) // М.: Мир науки, 2015. - 95 с. <http://izdmn.com/PDF/15MNNPM15.pdf> (доступ свободный). Загл. с экрана. Яз. рус.
66. Пинаев В.Е., Касимов Д.В., Афанасьева О.О. Раздел МООС проектной документации для трубопровода: мероприятия по охране и рациональному использованию земельных ресурсов и почвенного покрова (статья) // Журнал «Справочник Эколога» № 3 (27) март 2015 М., стр. 54-59
67. Пинаев В.Е., Касимов Д.В., Ледащева Т.Н. Сборник задач для экологов (HSE специалистов). Учебное пособие – М.: Мир науки, 2019. – Режим доступа: <https://izdmn.com/PDF/19MNNPU19.pdf> — Загл. с экрана. ISBN 978-5-6042806-9-0
68. Пинаев В.Е., Ледащева Т. Н. Совершенствование учета социо-эколого-экономических факторов (тезисы) // Экономика и экология: вызовы XXI века. Международная научная конференция, посвященная 110-летию со дня рождения академика Т. С. Хачатурова. Под ред. С.Н. Бобылева, К.В. Папенова, И.Ю. Ховавко Сборник тезисов - М.: Экономический факультет МГУ имени М. В. Ломоносова, 2016. — 140 с. ISBN 978-5-906783-47-9 стр. 56-58
69. Пинаев В.Е., Ледащева Т.Н. Вопросы мониторинга при оценке воздействия на окружающую среду (статья) // Сборник статей Международной научно-практической конференции «Государственное управление и развитие России: модели и проекты». Т. II. – Москва : Проспект, 2017. – 800 с. ISBN 978-5-392-24898-8 С. 14-21
70. Пинаев В.Е., Ледащева Т.Н. Вопросы обучения экологии, охране труда, промышленной и пожарной безопасности в России. Современная практика (статья) // Интернет-журнал «Отходы и ресурсы» Том 4, №1 (2017) <http://resources.today/PDF/01RRO117.pdf> (доступ свободный). Загл. с экрана. Яз. рус., англ. DOI: 10.15862/01RRO117

71. Пинаев В.Е., Ледащева Т.Н. Обращение с отходами в проекте мероприятий по охране окружающей природной среды (статья) // Интернет-журнал «Отходы и ресурсы» Том 3, №3 (2016) <http://resources.today/PDF/03RRO316.pdf> (доступ свободный). Загл. с экрана. Яз. рус., англ.
72. Пинаев В.Е., Ледащева Т.Н. Современная практика учета социо-эколого-экономических факторов в проектном цикле (статья) // Сборник статей международной научно- практической конференции «Россия: Государство и общество в новой реальности» ИГСУ РАНХ и ГС 2015, М, Проспект, 2016. том II Стр. 18-30 ISBN 978-5-392-22344-2
73. Пинаев В.Е., Ледащева Т.Н. Экспертиза нефтегазовых проектов – раздел охрана атмосферного воздуха (статья) // Интернет-журнал «НАУКОВЕДЕНИЕ» Том 8, №4 (2016) <http://naukovedenie.ru/PDF/86EVN416.pdf> (доступ свободный). Загл. с экрана. Яз. рус., англ.
74. Пинаев В.Е., Ледащева Т.Н. Элементы учебно-методического комплекса по дисциплине «Оценка воздействия на окружающую среду» (статья) // Интернет-журнал «Мир Науки» Выпуск 3 (5) 2014 (июль — сентябрь) режим доступа <http://mir-nauki.com/PDF/25PMN314.pdf>
75. Пинаев В.Е., Ледащева Т.Н. Элементы учебно-методического комплекса по дисциплине «Оценка современного состояния окружающей среды» (статья) // Интернет-журнал «Мир Науки» Выпуск 3 (5) 2014 (июль — сентябрь) режим доступа <http://mir-nauki.com/PDF/26PMN314.pdf>
76. Пинаев В.Е., Ледащева Т.Н. Элементы учебно-методического комплекса по дисциплине «Когнитивное моделирование социо-эколого-экономических систем» (статья) // Интернет-журнал «Мир Науки» Выпуск 4 (6) 2014 (октябрь — декабрь) ISSN 2309-4265 режим доступа <http://mir-nauki.com/PDF/06PMN414.pdf>
77. Пинаев В.Е., Ледащева Т.Н. Элементы учебно-методического комплекса по дисциплине «Экологический аудит» (статья) // Интернет-журнал «Мир Науки» Выпуск 4 (6) 2014 (октябрь — декабрь) ISSN 2309-4265 режим доступа <http://mir-nauki.com/PDF/07PMN414.pdf>
78. Пинаев В.Е., Ледащева Т.Н., Чернышев Д.А. Некоторые аспекты ликвидации накопленного экологического ущерба (статья) // Сборник статей международной научно- практической конференции «Российское государство и социально-экономические вызовы современности» ИГСУ РАНХ и ГС, М, Проспект, 2015. Стр. 523-536
79. Пинаев В.Е., Михеева А.И. Оценка отходов и накопленного экологического ущерба по материалам дистанционного зондирования Земли при проведении оценки современного состояния окружающей среды (статья) // Интернет-журнал «НАУКОВЕДЕНИЕ» Том 9, №1 (2017) <http://naukovedenie.ru/PDF/17EVN117.pdf> (доступ свободный). Загл. с экрана. Яз. рус., англ.
80. Пинаев В.Е., Романов А.С., Ледащева Т.Н. Подготовка НСЕ-специалистов – подручные средства для оказания первой помощи // Актуальные проблемы экологии и природопользования: сборник научных трудов XVIII Всероссийской научно-практической конференции. М.: РУДН, 2017. С. 300-303
81. Пинаев В.Е., Чернышев Д. А. Ликвидация накопленного экологического ущерба - организационные и правовые аспекты. (монография) // М.: Мир науки, 2017.– Режим доступа: <http://izd-mn.com/PDF/07MNNPM17.pdf> – Загл. с экрана.
82. Пинаев В.Е., Чернышев Д.А. Регулирование деятельности по обращению с отходами – опыт Европейского Союза (статья) // Интернет-журнал «Наукоедение» (учредитель журнала НОУ ВПО ИГУПИТ) Выпуск 4 (23) 2014 (октябрь — ноябрь) режим доступа <http://naukovedenie.ru/PDF/04EVN414.pdf>



83. Пинаев В.Е., Чернышёв Д.А. Ликвидация накопленного экологического ущерба – организационные и правовые аспекты: монография – М.: Мир науки, 2017. – URL: <http://izd-mn.com/PDF/07MNNPM17.pdf> – Загл. с экрана
84. Пинаев В.Е., Якунин С.А. Обзор современных методик расчета ущерба, причиненного животному миру, в Российской Федерации // Отходы и ресурсы. 2017. Т. 4. № 2. URL: <http://resources.today/PDF/02RRO217.pdf> (доступ свободный). Загл. с экрана. Яз. рус., англ. DOI: 10.15862/02RRO217
85. Пинаев В.Е., Якунин С.А. Обзор современных методик расчета ущерба, причиненного животному миру, в Российской Федерации (статья) // Интернет-журнал «Отходы и ресурсы» Том 4, №2 (2017) <http://resources.today/PDF/02RRO217.pdf> (доступ свободный). Загл. с экрана. Яз. рус.
86. Рюмина Е.В. Экономический анализ ущерба от экологических нарушений. М.: Наука, 2009, 331 с.
87. Сорокин Н.Д. Пособие по разработке проектной документации «Перечень мероприятий по охране окружающей среды». СПб.: Знание, 2013. – 545 с.
88. Чернышев Д.А., Пинаев В.Е., Ледашева Т.Н. Некоторые аспекты ликвидации накопленного экологического ущерба // Сборник статей международной научно-практической конференции «Российское государство и социально-экономические вызовы современности» ИГСУ РАНХ и ГС. М.: Проспект, 2015. С. 523–536.
89. Чернышев Д.А., Пинаев В.Е. Анализ отечественной нормативно-правовой базы, регулирующей сферу экологического ущерба от прошлой хозяйственной деятельности // Интернет-журнал «Науковедение» (учредитель журнала НОУ ВПО ИГУПИТ). 2014. № 5 (24). Сентябрь–октябрь. URL: <http://naukovedenie.ru/PDF/175EVN514.pdf>
90. Чернышев Д.А., Пинаев В.Е. Анализ отечественной нормативно-правовой базы, регулирующей сферу экологического ущерба от прошлой хозяйственной деятельности (статья) / Интернет-журнал «Науковедение» (учредитель журнала НОУ ВПО ИГУПИТ) № 5 (24) выпуск сентябрь–октябрь 2014 режим доступа <http://naukovedenie.ru/PDF/175EVN514.pdf>
91. Чернышев Д.А., Пинаев В.Е. Обращение с отходами производства и потребления – вопросы лицензирования // Интернет-журнал «Науковедение» (учредитель журнала НОУ ВПО ИГУПИТ). 2014. № 3 (22). Май–июнь 2014 URL: <http://naukovedenie.ru/PDF/76EVN314.pdf> ISSN 2223-5167
92. Чернышев Д.А., Пинаев В.Е. Проблемы лицензирования в области обращения с отходами: развитие СРО (статья) // Журнал «Справочник Эколога» № 7 (19) июль 2014 М., стр. 18-24
93. Чернышев Д.А., Пинаев В.Е. Регулирование деятельности по обращению с отходами – опыт Европейского Союза (статья) / Интернет-журнал «Науковедение» (учредитель журнала НОУ ВПО ИГУПИТ) Выпуск 4 (23) 2014 (октябрь — ноябрь) режим доступа <http://naukovedenie.ru/PDF/04EVN414.pdf>
94. Шахин Д.А., Пинаев В.Е. Оценка современного состояния окружающей среды в рамках экологического сопровождения проектов: монография. М.: МАКС Пресс 2013. – 216 с. ISBN 978-5-317-04349-0
95. Шахин Д.А., Пинаев В.Е. Оценка современного состояния окружающей среды: привлечение соисполнителей (статья) // Журнал «Справочник Эколога» № 7 (19) июль 2014 М., стр. 67-75
96. Шахин Д.А., Пинаев В.Е. Полевой пробоотбор для оценки уровней содержания загрязняющих химических веществ по средам // Справочник Эколога. 2015. № 1 (25). Январь. С. 86–89.
97. Щевелева Т.И., Пинаев В.Е. Эколого-экономическая оценка проектов разведки и добычи углеводородного сырья на море // Природообустройство: научно-практический журнал М.: МГУП, 2013. № 3. С. 102–105.

- 
98. Экологические индикаторы качества роста региональной экономики/ Под ред. И.П. Глазыриной, И.М. Потравного. –М.: НИА-Природа, 2006.-306 с.
99. Экономический анализ движения природных ресурсов в России: коллективная монография/ под науч. ред. О.В. Кудрявцевой.- Москва: Проспект, 2015, 144 с.

**Annex 1. List of RF legislation for monitoring purposes**

1. GN 2.1.5.1315-03. Maximum Permissible Concentrations (MPC) of Chemical Compounds in Water Bodies of Drinking and Domestic Water Use.
2. GN 2.1.5.2307-07. Tentatively Permissible Levels (TPL) of Chemical Compounds in Water Bodies of Drinking and Domestic Water Use.
3. GN 2.1.6.1338-03. Maximum Permissible Concentrations (MPC) of Contaminants in Ambient Air of Populated Areas.
4. GN 2.1.5.2280-07. Maximum Permissible Concentrations (MPC) of Chemical Compounds in Water Bodies of Drinking and Domestic Water Use. Amendments and Corrections No. 1 to GN 2.1.5.1315-03. Approved by Decree No. 75 of the Chief Sanitary Officer of Russian Federation of September 28, 2008. Registered by Ministry of Justice of Russian Federation (No. 10520 of November 22, 2007). Valid since December 15, 2007.
5. GN 2.1.6.2309-07. Tentatively Safe Impact Levels (TSIL) of Contaminants in Ambient Air of Populated Areas.
6. GN 2.1.7.2041-06. Maximum Permissible Concentrations (MPC) of Chemical Compounds in Soil.
7. GN 2.1.7.2511-09. Tentatively Permissible Concentrations (TPC) of Chemical Compounds in Soil. Approved by Decree No. 32 of the Chief Sanitary Officer of Russian Federation of May 18, 2009. Registered by Ministry of Justice of Russian Federation (No. 14121 of June 23, 2009). Valid since July 1, 2009.
8. GN 2.2.5.1313-03. Maximum Permissible Concentrations (MPC) of Hazardous Compounds in Air of Work Zone.
9. GN 2.2.5.1827-03. Maximum Permissible Concentrations (MPC) of Hazardous Compounds in Air of Work Zone. Amendment No. 1 to GN 2.2.5.1313-03.
10. Goryachkin S.V. Soil Zoning of European North: Recording of Ecosystem Interrelations in Soil Cover. Soil Studies at Russian European North, Arkhangelsk, 1996, P. 37-45.
11. GOST 17.1.3.07-82. Nature Protection. Hydrosphere. Rules of Control of Water Quality of Water Bodies and Water Courses.
12. GOST 17.1.1.01-77. Nature Protection. Hydrosphere. Water Use and Protection – Major Terms and Definitions.
13. GOST 17.1.3.06-82. Nature Protection. Hydrosphere. General Requirements to Groundwater Protection.
14. GOST 17.1.3.13-86. Nature Protection. Hydrosphere. General Requirements to Surface Water Protection against Contamination.
15. GOST R 51232-98. Drinking Water. General Requirements to Organization and Methods of Quality Control.
16. GOST R 51592-2000. Water. General Requirements to Sampling.
17. GOST 17.1.5.01-80. General Requirements to Sampling of Bottom Sediments in Water Bodies for Contamination Analyses.
18. GOST 17.1.5.05-85. General Requirements to Sampling of Surface and Sea Water, Ice and Precipitations.
19. GOST 17.2.3.02-78. Nature Protection. Atmosphere. Rules of Establishing of Permissible Emissions of Hazardous Compounds by Industries.
20. GOST 17.2.3.01-86. Atmosphere. Rules of Air Quality Control of Populated Areas.
21. GOST 17.2.1.04-77. Nature Protection. Atmosphere. Sources and Meteorological Factors of Contamination, Industrial Emissions.
22. GOST 17.4.1.02-83. Nature Protection. Soil. Classification of Chemical Compounds for Contamination Control.

23. GOST 17.4.3.01-83. (ST of Council for Mutual Economic Assistance 3847-82). Nature Protection. Soil. General Requirements to Sampling.
24. GOST 17.4.3.04-85. Nature Protection. Soil. General Requirements to Control and Protection against Contamination.
25. GOST 17.4.4.02-84. Nature Protection. Soil. Methods of Sampling and Sample Preparation for Chemical, Bacteriological, Helmintological Analysis.
26. Methodological Guidelines for Contaminated and Disturbed Soil Investigations. The Russian Federal Committee on Land Resources and Management. Notice No. 3-15/582 of March 27, 1995. Approved by Russian Ministry of Natural Resources, Ministry of Agricultural Products and agreed by Russian Academy of Agricultural Science.
27. Methodological Textbook on Calculation, Rating and Control of Contaminant Emissions in Ambient Air. Saint-Petersburg, 2005.
28. List of Regulatory Documents Recommended for Use by Implementation of State Environmental Review as well as by Environmental Design of Operations and other Activities. Approved by Decree of Russian State Committee on the Environment Protection on September 25, 1997, No. 397.
29. Procedure of Determination of Damage Extent for Land Contamination by Chemical compounds. Approved by Russian State Land Committee and Ministry of Natural Resources on November 10, 1993, valid since this date.
30. Decree of Russian Government of December 30, 2006 No. 881. On Approval Procedure of Norms of Allowable Impact on Water Bodies.
31. Decree of Russian Government of July 23, 2007 No. 469. On Approval Procedure of Norms of Permissible Discharge of Compounds and Microorganisms into Water Bodies for Water Users.
32. Pidgaiko M.L. etc. Short Biological and Product Description of Water Bodies of North-West of the USSR. Proceedings of the State Institute of Fishery Organization. Leningrad, 1968. P. 205-229.
33. Procedure of Organization of Development and Approval of MPC and TSIL for Contaminants in Water of Fishery Water Bodies. Approved by Russian State Fishery Committee on August 14, 1995, No. 12-04-11/454.
34. Safety Rules in Oil and Gas Industry. Approved by Decree of the Russian State Technological Supervising Agency on June 5, 2003, No. 56.
35. Rules of Design and Safe Operation of Flare Systems. Approved by Decree of the Russian State Technological Supervising Agency on June 10, 2003, No. 83.
36. Order of the Russian Ministry of Natural Resources No. 311 of November 29, 2007. On Approval of Accounting Procedure of Water Resources Extraction Rate and Wastewater and (or) Drainwater Discharge, their Quality by Owners of Water Bodies and Water Users.
37. Order of Federal Fishery Agency No. 20 of January 18, 2010. On Approval of Norms of Quality of Water Bodies of Fishery Importance including Norms of Maximum Permissible Concentrations of Hazardous Substances in Water Bodies of Fishery Importance. Registered by the Russian Ministry of Justice (No. 16326 of February 9, 2010).
38. RD 52.04.186-89. Manual on Control of Atmosphere Contamination.
39. RD 51-1-96. Manual on Nature Protection during On-shore Well Construction at Polycomponent Hydrocarbon Reserves including Containing Hydrogen Sulphide. Approved by Russian Ministries of Fuel and Energy and Natural Resources on January 25, August 10, 1996.
40. Recommendations on Major Issues of Air Protection Activity. Moscow, 1995.
41. SanPiN 2.1.5.980-00. Sanitary Requirements to Surface Water Protection.
42. SanPiN 2.1.6.1032-01. Sanitary Requirements to Quality Assurance of Ambient Air.

43. SanPiN 2.1.4.1074-01. Sanitary Requirements to Water Quality of Centralized Systems of Drinking Water Supply. Quality Control.
44. SanPiN 2.1.4.1110-02. Sanitary Protection Zones of Sources of Water Supply and Water Systems of Drinking Purpose.
45. SanPiN 2.2.1/2.1.1.1200-03. Sanitary Protection Zones and Sanitary Classification of Plants, Facilities and other Subjects.
46. SanPiN 2.1.7.1287-03. Sanitary and Epidemiological Requirements to Soil Quality.
47. SanPiN 2.6.1.2523-09. Norms of Radiological Safety (NRB-99/2009).
48. SP 11-102-97. Engineering and Environmental Survey for Construction.
49. SP 2.1.5.1059-01. Hygienic Requirements to Groundwater Protection against Contamination.
50. Federal Law of May 4, 1999 No. 96-FZ. On Protection of Ambient Air.
51. Federal Law of January 10, 2002 No. 7-FZ. On Environmental Protection.
52. Federal Law of March 30, 1999 No. 52-FZ. On Sanitary and Epidemiological Welfare of Population.

Detailed information on content of listed documents is available in Russian in electronic data bases i.e.: [www.garant.ru](http://www.garant.ru) [www.consultant.ru](http://www.consultant.ru) [www.cntd.ru](http://www.cntd.ru)

**Annex 2. Decree of RF Government of 13 September 2016 N 913 On rates of payment for negative impact on the environment and additional factors**  
**Rates of payment for negative impact on the environment \***

(RUR)

Name of pollutant		Payment rates for 1 ton of polluting substances (production and consumption wastes)		
		Year 2016	Year 2017	Year 2018
I. Rates of payment for emission into ambient air from stationary sources				
1.	Nitrogen dioxide	133,1	138,8	138,8
2.	Nitrogen oxide	89,6	93,5	93,5
3.	Nitric acid	35,1	36,6	36,6
4.	Ammonia	133,1	138,8	138,8
5.	Ammonium nitrate (ammonium nitrate)	19,2	20	20
6.	Barium and its salts (in terms of barium)	1061,9	1108,1	1108,1
7.	Benz (a) pyrene	5247490,6	5472968,7	5472968,7
8.	Boric acid (orthoboric acid)	263,7	275	275
9.	Vanadium pentoxide	2624	2736,8	2736,8
10.	PM10 suspended particles	89,6	93,5	93,5
11.	PM2.5 suspended particles	174,8	182,4	182,4
12.	Suspended substances	35,1	36,6	36,6
13.	Hydrogen bromide (hydrobromide)	53,8	56,1	56,1
14.	Arsenic hydrogen (arsine)	2624	2736,8	2736,8
15.	Phosphorous hydrogen (phosphine)	5248	5473,5	5473,5
16.	Hydrogen cyanide	524,8	547,4	547,4
17.	Sulfur hexafluoride	0,3	0,3	0,3
18.	Dialuminium trioxide (in terms of aluminum)	424,4	442,8	442,8
19.	Dioxins (polychlorinated dibenzo-p-dioxins and dibenzofurans) in terms of 2,3,7,8-tetrachlorodibenzo-1,4-dioxin	12,8	13400000000	13400000000
20.	Diethyl mercury (in terms of mercury)	17492,5	18244,1	18244,1
21.	Iron trichloride (in terms of iron)	1313,3	1369,7	1369,7
22.	Solid fuel ash	14,5	15,1	15,1
23.	Ash TPP fuel oil (in terms of vanadium)	2121,8	2214	2214
24.	Cadmium and its compounds	14144,3	14759,3	14759,3
25.	Sodium carbonate (disodium carbonate)	133,1	138,8	138,8

26.	Terephthalic acid	5248	5473,5	5473,5
27.	Cobalt and its compounds (cobalt oxide, cobalt salts in terms of cobalt)	4243,5	4428	4428
28.	Nickel, nickel oxide (in terms of nickel)	5248	5473,5	5473,5
29.	Nickel soluble salts (in terms of nickel)	26237,4	27364,8	27364,8
30.	Magnesium oxide	43,5	45,4	45,4
31.	Manganese and its compounds	5248	5473,5	5473,5
32.	Copper, copper oxide, copper sulfate, copper chloride (in terms of copper)	5248	5473,5	5473,5
33.	Methane	103,5	108	108
34.	Methyl mercaptan, ethyl mercaptan	52474,9	54729,7	54729,7
35.	Arsenic and its compounds, other than hydrogen arsenic	1748,5	1823,6	1823,6
36.	Ozone	174,8	182,4	182,4
37.	Inorganic dust containing silica in percent:			
	above 70 percent	105	109,5	109,5
	70-20 percent	53,8	56,1	56,1
	below 20 percent	35,1	36,6	36,6
38.	Mercury and its compounds, except diethyl mercury	17492,5	18244,1	18244,1
39.	Lead and its compounds, excluding tetraethyl lead (in terms of lead)	17492,5	18244,1	18244,1
40.	Hydrogen sulphide	657,9	686,2	686,2
41.	Carbon disulfide	1049,6	1094,7	1094,7
42.	Sulphuric acid	43,5	45,4	45,4
43.	Sulfur dioxide	43,5	45,4	45,4
44.	Tellurium dioxide	10496	10947	10947
45.	Tetraethyl lead	131187,2	136824,2	136824,2
46.	Carbon oxide	1,5	1,6	1,6
47.	Phosgene	1748,5	1823,6	1823,6
48.	Phosphoric anhydride (diphosphorus pentoxide)	105	109,5	109,5
49.	Fluorides gaseous (hydrofluoride, silicon tetrafluoride) (in terms of fluorine)	1049,6	1094,7	1094,7
50.	Solid fluorides	174,1	181,6	181,6
51.	Hydrogen fluoride, soluble fluoride	524,8	547,4	547,4
52.	Chlorine	174,1	181,6	181,6
53.	Hydrogen chloride	28,7	29,9	29,9



54.	Chloroprene	2624	2736,8	2736,8
55.	Chrome (6+)	3497	3647,2	3647,2
56.	Hydrocarbons lower paraffin C1-C5 (excluding methane)	103,5	108	108
57.	Hydrocarbons lower paraffin C6-C10	0,1	0,1	0,1
58.	Hydrocarbons lower paraffin C12-C19	10,4	10,8	10,8
59.	Cyclohexane	3,1	3,2	3,2
60.	Amylenes (mixture of isomers)	3,1	3,2	3,2
61.	Butylene	6,4	6,7	6,7
62.	1,3-Butadiene (divinyl)	6,4	6,7	6,7
63.	Hepten	89,6	93,5	93,5
64.	Propylene	1,5	1,6	1,6
65.	Ethylene	1,5	1,6	1,6
66.	Alpha methylstyrene	133,1	138,8	138,8
67.	Benzene	53,8	56,1	56,1
68.	Dimethylbenzene (xylene) (a mixture of meta-, ortho- and para isomers)	28,7	29,9	29,9
69.	Isopropyl benzene (cumene)	376,3	392,5	392,5
70.	Methylbenzene (toluene)	9,5	9,9	9,9
71.	Furniture thinner (AMP-3) (toluene control)	9,5	9,9	9,9
72.	1,3,5-trimethylbenzene (mesitylene)	53,8	56,1	56,1
73.	Phenol	1748,5	1823,6	1823,6
74.	Ethylbenzene	263,7	275	275
75.	Ethylene benzene (styrene)	2624	2736,8	2736,8
76.	Naphthalene	1748,5	1823,6	1823,6
77.	Bromobenzene	174,8	182,4	182,4
78.	1-Bromheptan (heptyl methyl)	524,8	547,4	547,4
79.	1-Bromdecane (methyl decyl)	524,8	547,4	547,4
80.	1 -Brom-3-methylbutane (isoamyl methyl)	524,8	547,4	547,4
81.	1-Bromo-2-methylpropane (isobutyl methyl)	524,8	547,4	547,4
82.	1-Bromopentane (amyl bromide)	524,8	547,4	547,4
83.	1-Bromopropane (propyl methyl)	524,8	547,4	547,4
84.	2-Bromopropane (isopropyl bromide)	524,8	547,4	547,4
85.	Dichloroethane	10,4	10,8	10,8

86.	Dichlorofluoromethane (freon 21)	20,7	21,6	21,6
87.	Difluorochloromethane (freon 22)	0,5	0,5	0,5
88.	1,2-Dichloropropane	45,5	47,5	47,5
89.	Methylene chloride	2,1	2,2	2,2
90.	Tetrachlorethylene (perchlorethylene)	89,6	93,5	93,5
91.	Tetrafluoroethylene	12,8	13,4	13,4
92.	Trichloromethane (chloroform)	174,1	181,6	181,6
93.	Trichlorethylene	10,4	10,8	10,8
94.	Tribromomethane (bromoform)	43,5	45,4	45,4
95.	Carbon tetrachloride (carbon tetrachloride)	9,5	9,9	9,9
96.	Chlorobenzene	53,8	56,1	56,1
97.	Chloroethane (ethyl chloride)	28,7	29,9	29,9
98.	Epichlorohydrin	28,7	29,9	29,9
99.	Hydroxymethylbenzene (cresol, a mixture of isomers: ortho-, meta-, para-)	263,7	275	275
100.	Amyl alcohol	524,8	547,4	547,4
101.	Butyl alcohol	53,8	56,1	56,1
102.	Isobutyl alcohol	53,8	56,1	56,1
103.	Isooctyl alcohol	35,1	36,6	36,6
104.	Isopropyl alcohol	9,5	9,9	9,9
105.	Methyl alcohol	12,8	13,4	13,4
106.	Propyl alcohol	19,2	20	20
107.	Ethanol	1	1,1	1,1
108.	Cyclohexanol	89,6	93,5	93,5
109.	Terephthalic acid dimethyl ester	524,8	547,4	547,4
110.	Dinil (a mixture of 25% diphenyl and 75% diphenyloxide)	524,8	547,4	547,4
111.	Diethyl ether	15,3	16	16
112.	Methylal (dimethoxymethane)	35,1	36,6	36,6
113.	Ethylene glycol monoisobutyl ether (butyl celloslose)	19,2	20	20
114.	Butyl Acrylate (Acrylic Acid Butyl Ester)	350,7	365,8	365,8
115.	Butyl acetate	53,8	56,1	56,1
116.	Vinyl acetate	35,1	36,6	36,6
117.	Methyl acrylate (methylprop-2-enoate)	424,4	442,8	442,8

118.	Methyl acetate	76,8	80,1	80,1
119.	Ethyl acetate	53,8	56,1	56,1
120.	Acrolein	174,1	181,6	181,6
121.	Aldehyde oil	350,7	365,8	365,8
122.	Acetaldehyde	524,8	547,4	547,4
123.	Formaldehyde	1748,5	1823,6	1823,6
124.	Acetone	15,9	16,6	16,6
125.	Acetophenone (methylphenyl ketone)	1748,5	1823,6	1823,6
126.	Methyl ethyl ketone	53,8	56,1	56,1
127.	Wood alcohol brand A solvent (acetone ether) (acetone control)	44,5	46,5	46,5
128.	Wood alcohol brand E solvent (ethereal acetone) (acetone control)	76,8	80,1	80,1
129.	Cyclohexanone	133,1	138,8	138,8
130.	Maleic anhydride (vapor, aerosol)	102,4	106,8	106,8
131.	Acetic anhydride	174,1	181,6	181,6
132.	Phthalic anhydride	53,8	56,1	56,1
133.	Dimethylformamide	174,1	181,6	181,6
134.	Epsilon-caprolactam (hexahydro-2H-azepin-2-one)	89,6	93,5	93,5
135.	Acrylic acid (prop-2-enic acid)	133,1	138,8	138,8
136.	Valerian Acid	524,8	547,4	547,4
137.	Kapron acid	1049,6	1094,7	1094,7
138.	Oil acid	524,8	547,4	547,4
139.	Propionic acid	350,7	365,8	365,8
140.	Acetic acid	89,6	93,5	93,5
141.	Formic acid	43,5	45,4	45,4
142.	Isopropyl benzene hydroperoxide (cumene hydroperoxide)	350,7	365,8	365,8
143.	Propylene oxide	66,6	69,4	69,4
144.	Ethylene oxide	174,1	181,6	181,6
145.	Dimethyl sulfide	66,6	69,4	69,4
146.	Aniline	174,1	181,6	181,6
147.	Dimethylamine	1049,6	1094,7	1094,7
148.	Triethylamine	38,4	40,1	40,1
149.	Nitrobenzene	657,9	686,2	686,2

150.	Acrylonitrile	174,1	181,6	181,6
151.	N, N1-Dimethylacetamide	896	934,5	934,5
152.	Toluene diisocyanate	263,7	275	275
153.	Gasoline (petroleum, low-sulfur in terms of carbon)	3,1	3,2	3,2
154.	Shale gasoline (in terms of carbon)	105	109,5	109,5
155.	Kerosene	6,4	6,7	6,7
156.	Mineral oil	43,5	45,4	45,4
157.	Turpentine	6,4	6,7	6,7
158.	Solvent naphtha	28,7	29,9	29,9
159.	White Spirit	6,4	6,7	6,7

## II. Fee rates for discharge of pollutants into water bodies

1.	Acrylonitrile (acrylic acid nitrile)	70522,9	73553,2	73553,2
2.	Aluminum	17630,7	18388,3	18388,3
3.	Alkylbenzylpyridinium chloride	814545	849960	849960
4.	Alkylsulfonates	1142,6	1192,3	1192,3
5.	Ammonium ion	1140,6	1190,2	1190,2
6.	Ammonia	14105,6	14711,7	14711,7
7.	Aniline (aminobenzene, pheniamine)	5702454,6	5950387,4	5950387,4
8.	Sodium acetate	1766,4	1842,3	1842,3
9.	Acetaldehyde	1900,3	1982,9	1982,9
10.	Acetone (dimethyl ketone, propanone)	14105,6	14711,7	14711,7
11.	Acetonitrile	814,5	850	850
12.	Barium	814,5	850	850
13.	Beryllium	1900943,1	1983592,8	1983592,8
14.	Benz (a) pyrene	70523113	73553403	73553403
15.	Benzene and its homologs	1413,1	1473,8	1473,8
16.	Boron	41484,8	43267,4	43267,4
17.	Boric acid	41484,8	43267,4	43267,4
18.	Bromodichloromethane	19008,8	19835,3	19835,3
19.	Bromide anion	640	667,5	667,5
20.	Butanol	19008,8	19835,3	19835,3
21.	Butyl acetate	1900,3	1982,9	1982,9
22.	Butyl methacrylate	705231,4	735534,3	735534,3

23.	Vanadium	705231,4	735534,3	735534,3
24.	Vinyl acetate	70522,9	73553,2	73553,2
25.	Vinyl chloride	71280864	74380032	74380032
26.	Bismuth	7052,8	7355,9	7355,9
27.	Tungsten	712808,6	743800,3	743800,3
28.	Hexane	1413,1	1473,8	1473,8
29.	Hydrazine hydrate	1900943,1	1983592,8	1983592,8
30.	Glycerin (propane-1,2,3-triol)	706,6	736,9	736,9
31.	Dibromochloromethane	19008,8	19835,3	19835,3
32.	1,2-Dichloroethane	7052,8	7355,9	7355,9
33.	1,4-dihydroxybenzene (hydroquinone)	705231,4	735534,3	735534,3
34.	2,6-dimethylaniline	19008,8	19835,3	19835,3
35.	Dimethylamine (N-methylmethanamine)	141056	147117	147117
36.	Dimethyl mercaptan (dimethyl sulfide)	70523113	73553403	73553403
37.	2,4-dinitrophenol	7052311	7355340	7355340
38.	Dimethylformamide	1900,3	1982,9	1982,9
39.	o-dimethyl phthalate (dimethylbenzene-1,2-dicarboxate)	1140,6	1190,2	1190,2
40.	1,2-Dichloropropane	14105,6	14711,7	14711,7
41.	Cis-1,3-dichloropropene	141056	147117	147117
42.	Trans-1,3-dichloropropene	70522,9	73553,2	73553,2
43.	2,4-Dichlorophenol (hydroxydichlorobenzene)	7052311	7355340	7355340
44.	Dodecylbenzene	7052311	7355340	7355340
45.	Dichloromethane (methylene chloride)	70,7	73,7	73,7
46.	Iron	5702,9	5950,8	5950,8
47.	Cadmium	141045,8	147106,3	147106,3
48.	Potassium	15,9	16,6	16,6
49.	Calcium	3,1	3,2	3,2
50.	Caprolactam (hexahydro-2H-azepin-2-one)	70522,9	73553,2	73553,2
51.	Urea (urea)	9,5	9,9	9,9
52.	Cobalt	70522,9	73553,2	73553,2
53.	Silicon (silicates)	70,7	73,7	73,7
54.	o-Cresol (2-methylphenol)	190088,1	198352,8	198352,8
55.	p-Cresol (4-methylphenol)	176307,2	183882,9	183882,9

56.	Xylene (o-xylene, m-xylene, p-xylene)	14105,6	14711,7	14711,7
57.	Ligninsulfonic acids	706,6	736,9	736,9
58.	Lignosulfonates	706,6	736,9	736,9
59.	Lithium	7127	7436,9	7436,9
60.	Magnesium	14,3	14,9	14,9
61.	Manganese	70522,9	73553,2	73553,2
62.	Copper	705231,4	735534,3	735534,3
63.	Methanol (methyl alcohol)	7052,8	7355,9	7355,9
64.	Methyl acrylate (methylprop-2-enoate, acrylic acid methyl ester)	705231,4	735534,3	735534,3
65.	Methanethiol (methyl mercaptan)	3527680	3679260	3679260
66.	Methyl acetate	1900,3	1982,9	1982,9
67.	Methol (1-hydroxy-4- (methylamino) benzene)	950405,3	991727,3	991727,3
68.	Molybdenum	587694,1	612946,6	612946,6
69.	Monoethanolamine	70522,9	73553,2	73553,2
70.	Arsenic and its compounds	14105,6	14711,7	14711,7
71.	Sodium	6,4	6,7	6,7
72.	Naphthalene	176307,2	183882,9	183882,9
73.	Oil products (oil)	14105,6	14711,7	14711,7
74.	Nickel	70522,9	73553,2	73553,2
75.	Nitrate anion	14,3	14,9	14,9
76.	Nitrite anion	7129,1	7439	7439
77.	Nitrobenzene	70522,9	73553,2	73553,2
78.	Tin and its compounds	5092,2	5313,6	5313,6
79.	1,1,2,2,3-pentachloropropane	705231,4	735534,3	735534,3
80.	Pentachlorophenol	70522,9	73553,2	73553,2
81.	Pyridine	70522,9	73553,2	73553,2
82.	Polyacrylamide	7127	7436,9	7436,9
83.	Propanol	1900,3	1982,9	1982,9
84.	Rodanide ion	5702,9	5950,8	5950,8
85.	Rubidium	7052,8	7355,9	7355,9
86.	Mercury and its compounds	70523113	73553403	73553403
87.	Lead	95039,9	99172,1	99172,1
88.	Selenium	285121,8	297518,4	297518,4

89.	Silver	14105,6	14711,7	14711,7
90.	Carbon disulfide	706,6	736,9	736,9
91.	ASPAV (anionic synthetic surfactants)	1142,6	1192,3	1192,3
92.	KSPAV (cationic synthetic surfactants)	1142,6	1192,3	1192,3
93.	NSAID (non-ionic synthetic surfactants)	1142,6	1192,3	1192,3
94.	Turpentine	3527,7	3679,3	3679,3
95.	Styrene (ethenylbenzene, vinylbenzene)	7052,8	7355,9	7355,9
96.	Strontium	1426,2	1488,2	1488,2
97.	Sulfate anion (sulfates)	5,8	6	6
98.	Sulphides	114048,7	119007,4	119007,4
99.	Sulfite anion	300,2	313,2	313,2
100.	Antimony	14105,6	14711,7	14711,7
101.	Thallium	7052311	7355340	7355340
102.	Tellurium	190088,1	198352,8	198352,8
103.	1,1,1,2-tetrachloroethane	70522,9	73553,2	73553,2
104.	Tetrachlorethylene (perchlorethylene)	3525,1	3676,6	3676,6
105.	Carbon tetrachloride (carbon tetrachloride)	705231,4	735534,3	735534,3
106.	Tetraethyl lead	70523113	73553403	73553403
107.	Thiocarbamide (thiourea)	706,6	736,9	736,9
108.	Thiosulfates	190	198,3	198,3
109.	Titanium	9503,4	9916,6	9916,6
110.	Toluene	1413,1	1473,8	1473,8
111.	Trilon B (ethylenediaminetetraacetic acid disodium salt)	1413,1	1473,8	1473,8
112.	Triethylamine	706,6	736,9	736,9
113.	Trichlorobenzene (sum of isomers)	705231,4	735534,3	735534,3
114.	1,2,3-Trichloropropane	141056	147117	147117
115.	2,4,6-Trichlorophenol	7052311	7355340	7355340
116.	Trichlorethylene	70522,9	73553,2	73553,2
117.	Acetic acid	70522,9	73553,2	73553,2
118.	Phenol, hydroxybenzene	705231,4	735534,3	735534,3
119.	Formaldehyde (methane, formic aldehyde)	7052,8	7355,9	7355,9
120.	Phosphates (phosphorus)	3527,7	3679,3	3679,3
121.	Fluoride anion	942,1	982,6	982,6



122.	Furfural	70522,9	73553,2	73553,2
123.	Free chlorine, dissolved and organochlorine compounds	70523113	73553403	73553403
124.	Chlorate anion	14105,6	14711,7	14711,7
125.	Chlorobenzene	705231,4	735534,3	735534,3
126.	Chloroform (trichloromethane)	141056	147117	147117
127.	Chlorophenols	7052311	7355340	7355340
128.	Chloride anion (chlorides)	2,3	2,4	2,4
129.	Trivalent chromium	8145,5	8499,6	8499,6
130.	Chromium hexavalent	28512,2	29751,8	29751,8
131.	Cesium	706,6	736,9	736,9
132.	Cyanide anion	14105,6	14711,7	14711,7
133.	Cyclohexanol	705231,4	735534,3	735534,3
134.	Zinc	70522,9	73553,2	73553,2
135.	Zirconium	8145,5	8499,6	8499,6
136.	Ethanol	70522,9	73553,2	73553,2
137.	Ethyl acetate	2852,5	2976,5	2976,5
138.	Ethylbenzene	705231,4	735534,3	735534,3
139.	Ethylene glycol (glycol, ethanediol-1,2)	2821,1	2942,3	2942,3
140.	Aldrin (1,2, W, 10,10-hexachloro-1,4,4a, 5,8,8a-hexahydro-1,4-endoexo-5,8-dimethanonaphthalene)	70523113	73553403	73553403
141.	Atrazine (6-chloro-N-ethyl-N' - (1-methylethyl) - 1,3,5-triazine-2,4-diamine)	141045,8	147106,3	147106,3
142.	Hexachlorobenzene	705231,4	735534,3	735534,3
143.	Hexachlorocyclohexane (alpha, beta, gamma isomers)	70523113	73553403	73553403
144.	2,4-D (2,4-dichlorophenoxyacetic acid and derivatives)	7065,6	7369,2	7369,2
145.	Dieldrin (1,2,3,4,10,10-hexachloro-exo-6,7-epoxy-1,4,4a, 5,6,7,8,8a-octahydro-1,4-endo, exo- 5,8-dimethanonaphthalene)	70523113	73553403	73553403
146.	Dioxins	70523113	73553403	73553403
147.	Captan (3a, 4, 7, 7a-tetrahydro-2 - [(trichloromethyl) thio] -1n-isoindole-1, 3 (2n) - dione)	950405,3	991727,3	991727,3
148.	Karbofos (diethyl (dimethoxyphosphonothionyl) tiobutanedionate)	70523113	73553403	73553403
149.	4,4'-DDT (p, p'-DDT, 4,4'-dichlorodiphenyltrichloromethyl)	70523113	73553403	73553403

150.	4,4'-DDD (dichlorodiphenyldichloroethane)	70523113	73553403	73553403
151.	Prometrin (2,4-Bis (isopropylamino) -6-methylthio-simm-triazine)	14105,6	14711,7	14711,7
152.	Simazine (b-chloro-N, N'-diethyl-1,3,5-triazines-2,4-diamine)	352768	367926	367926
153.	Polychlorinated biphenyls (PCB 28, PCB 52, PCB 74, PCB 99, PCB 101, PCB 105, PCB 110, PCB 153, PCB 170)	70523113	73553403	73553403
154.	Trifluralin (2,6-dinitro-N, N-dipropyl-4-(trifluoromethyl) aniline)	2350771,2	2451780,9	2451780,9
155.	THAN (sodium trichloroacetate, TCA)	20149,8	21015,6	21015,6
156.	Fozalon (O, O-diethyl- (S-2,3-dihydro-6-chloro-2-oxobenzoxazol-3-ylmethyl) -dithiophosphate)	23507706,9	24517803,7	24517803,7
157.	BOD total.	233	243	243
158.	Suspended solids	937	977,2	977,2
159.	Solid (dry) residue	0,5	0,5	0,5

Remark.

The rate of payment for discharges of suspended solids is applied using a coefficient defined as the reciprocal of the amount of permissible increase in the content of suspended solids when discharging wastewater to the background of the water body and the background concentration of suspended substances in the water of a water body adopted when establishing standards for maximum permissible discharges of pollutants.

## III. Fee rates for waste disposal

1.	I class of hazard wastes (extremely hazardous)	4452,4	4643,7	4643,7
2.	II class of hazard wastes (highly hazardous)	1908,2	1990,2	1990,2
3.	III class of hazard wastes (prevention regimerately hazardous)	1272,3	1327	1327
4.	IV class of hazard wastes (law hazard) (excluding solid municipal wastes of IV class of hazard (law hazard)	635,9	663,2	663,2
5.	V class of hazard wastes(virtually harmless):			
	exploration industry	1	1,1	1,1
	Processing industry	38,4	40,1	40,1
	other	16,6	17,3	17,3

### Annex 3 Water consumption fee (Extract form Resolution of the Government of the Russian Federation of December 30, 2006 No. 876 "On the rates of payment for the use of water bodies in federal ownership")

Fee for water and water bodies use<sup>19</sup>

*I. Rates of payment for the intake (withdrawal) of water resources from surface water bodies or their individual parts (except seas) within the scope of permissible intake (withdrawal) of water resources established by the water use agreement*

River basins	Subject of Russian Federation	Fee rates (rubles per 1 thousand cubic meters of water resources)
<b>Amur</b>	Primorsky Krai	264
	Khabarovsk Territory	264
	Amur region	264
	Trans – Baikal (Zabaikalie) Territory	276
	Jewish Autonomous Region	264
<b>Volga</b>	Republic of Bashkortostan	294
	Republic of Kalmykia	294
	Republic of Komi	300
	Republic of Mari El	282
	Republic of Mordovia	282
	Republic of Tatarstan	294
	Udmurt Republic	294
	Chuvash Republic	282
	Perm Region	294
	Astrakhan region	294
	Bryansk region	288
	Vladimir region	288

<sup>19</sup> For more details in Russian see Постановление Правительства РФ от 30 декабря 2006 г. N 876 "О ставках платы за пользование водными объектами, находящимися в федеральной собственности" <https://base.garant.ru/12151373/?ysclid=15tajjsnag247797714>

River basins	Subject of Russian Federation	Fee rates (rubles per 1 thousand cubic meters of water resources)
	Vologda region	300
	Volgograd region	294
	Ivanovo region	288
	Kaluga Region	288
	Kirov region	282
	Kostroma region	288
	Leningrad Region	294
	Lipetsk region	282
	Moscow oblast	288
	Nizhny Novgorod region	282
	Novgorod region	294
	Orenburg region	294
	Oryol region	288
	Penza region	294
	Ryazan region	288
	Samara region	294
	Saratov region	294
	Sverdlovsk region	294
	Smolensk region	288
	Tambov region	282
	Tver region	288
	Tula region	288
	Ulyanovsk region	294

River basins	Subject of Russian Federation	Fee rates (rubles per 1 thousand cubic meters of water resources)
	Chelyabinsk region	294
	Yaroslavl region	288
	The city of Moscow	288
<b>Dnipro</b>	Belgorod region	258
	Bryansk region	276
	Kaluga Region	276
	Kursk region	258
	Oryol region	276
	Smolensk region	276
<b>Don</b>	Republic of Kalmykia	360
	Krasnodarskiy kray	390
	Stavropol Territory	390
	Belgorod region	336
	Volgograd region	360
	Voronezh Region	336
	Kursk region	336
	Lipetsk region	336
	Oryol region	294
	Penza region	360
	Rostov region	390
	Ryazan region	294
	Saratov region	360
	Tambov region	336

River basins	Subject of Russian Federation	Fee rates (rubles per 1 thousand cubic meters of water resources)
	Tula region	294
Yenisei	Republic of Buryatia	246
	Republic of Tyva	246
	Republic of Khakassia	246
	Krasnoyarsk Territory	246
	Irkutsk region	246
	Tyumen region	246
	Yamalo-Nenets Autonomous Okrug	246
Western Dvina	Pskov region	288
	Smolensk region	306
	Tver region	306
Kuban	Republic of Adygea	480
	Karachay-Cherkess Republic	480
	Krasnodarskiy kray	480
	Stavropol Territory	480
Lena	Republic of Buryatia	252
	Republic of Sakha (Yakutia)	288
	Krasnoyarsk Territory	252
	Khabarovsk Territory	288
	Amur region	288
	Irkutsk region	252
	Trans-Baikal Territory	252

River basins	Subject of Russian Federation	Fee rates (rubles per 1 thousand cubic meters of water resources)
<b>Neva</b>	Republic of Karelia	264
	Arkhangelsk region	264
	Vologda region	264
	Leningrad Region	258
	Novgorod region	258
	Pskov region	258
	Tver region	252
	The city of Saint Petersburg	258
<b>Neman</b>	Kaliningrad Region	276
<b>Ob</b>	Republic of Altai	270
	Republic of Bashkortostan	282
	Republic of Khakassia	264
	Altai Territory	270
	Perm Region	282
	Krasnoyarsk Territory	264
	Kemerovo region	270
	Kurgan region	282
	Novosibirsk region	270
	Omsk region	270
	Orenburg region	282
	Sverdlovsk region	282
	Tomsk region	270
	Tyumen region	270



River basins	Subject of Russian Federation	Fee rates (rubles per 1 thousand cubic meters of water resources)
	Chelyabinsk region	282
	Khanty-Mansi Autonomous Okrug - Yugra	270
	Yamalo-Nenets Autonomous Okrug	270
<b>Pechora</b>	Komi Republic	246
	Arkhangelsk region	246
	Nenets Autonomous Okrug	246
<b>Samur</b>	Republic of Dagestan	480
<b>Northern Dvina</b>	Komi Republic	258
	Arkhangelsk region	258
	Vologda region	258
	Kirov region	252
	Kostroma region	264
	Yaroslavl region	264
<b>Sulak</b>	Republic of Dagestan	456
	Chechen Republic	456
<b>Terek</b>	Republic of Dagestan	468
	Republic of Ingushetia	468
	Kabardino-Balkarian Republic	468
	Republic of North Ossetia - Alania	468
	Chechen Republic	468
	Stavropol Territory	468

River basins	Subject of Russian Federation	Fee rates (rubles per 1 thousand cubic meters of water resources)
Ural	Republic of Bashkortostan	354
	Orenburg region	354
	Chelyabinsk region	354
Rivers of the Azov Sea basin (with the exception of the Don and Kuban rivers)	Republic of Crimea	540
	Krasnodarskiy kray	540
	Stavropol Territory	540
	Rostov region	540
Rivers of the Baltic Sea basin (except for the Neva and Neman rivers)	Kaliningrad Region	288
	Leningrad Region	282
	Novgorod region	282
	Pskov region	282
	Tver region	264
Rivers of the Barents Sea basin (with the exception of the Pechora River)	Arkhangelsk region	306
	Murmansk region	306
	Nenets Autonomous Okrug	306
Rivers of the White Sea basin (with the exception of the Severnaya Dvina River)	Republic of Karelia	306
	Komi Republic	306
	Arkhangelsk region	306
	Nenets Autonomous Okrug	306
	Vologda region	306
	Murmansk region	306
Rivers of the Bering Sea basin	Kamchatka Region	252
	Chukotka Autonomous Okrug	252
Rivers of the East Siberian Sea basin	Republic of Sakha (Yakutia)	252
	Magadan region	252
	Chukotka Autonomous Okrug	252
Rivers of the Kara Sea basin (with the exception	Komi Republic	306
	Krasnoyarsk Territory	282

River basins	Subject of Russian Federation	Fee rates (rubles per 1 thousand cubic meters of water resources)
of the Yenisei and Ob rivers)	Arkhangelsk region	306
	Tyumen region	276
	Nenets Autonomous Okrug	306
	Yamalo-Nenets Autonomous Okrug	276
Rivers of the Caspian Sea basin (with the exception of the Volga, Samur, Sulak, Terek and Ural rivers)	Republic of Dagestan	540
	Republic of Kalmykia	264
	Kabardino-Balkarian Republic	540
	Karachay-Cherkess Republic	540
	Stavropol Territory	540
	Volgograd region	264
	Orenburg region	306
	Saratov region	264
Rivers of the Laptev Sea basin (with the exception of the Lena River)	Republic of Sakha (Yakutia)	252
	Krasnoyarsk Territory	282
Rivers of the Okhotsk Sea basin (with the exception of the Amur River)	Primorsky Krai	252
	Khabarovsk Territory	252
	Kamchatka Region	252
	Amur region	252
	Magadan region	252
	Sakhalin Region	252
Rivers of the Black Sea basin (with the exception of the Dnieper River)	Republic of Crimea	540
	Krasnodarskiy kray	540
	The city of Sevastopol	540
Rivers of the Chukchi Sea basin Rivers of the Sea of Japan Basin	Chukotka Autonomous Okrug	252
	Primorsky Krai	252
	Khabarovsk Territory	252
	Sakhalin Region	252
	Kamchatka Region	252

River basins	Subject of Russian Federation	Fee rates (rubles per 1 thousand cubic meters of water resources)
Rivers of the Pacific Ocean basin	Sakhalin Region	252
	Republic of Buryatia	576
	Irkutsk region	576
	Trans – Baikal (Zabaikalie) Territory	576

Note. The rate of payment for the withdrawal (withdrawing) of water resources established by the river basin is applied to all surface water bodies that are federally owned and located within the boundaries of the river basin.

*II. Rates of payment for the intake (withdrawing) of water resources from water bodies or their individual parts within the scope of permissible intake (withdrawing) of water resources established by the water use agreement*

Water bodies (within the territorial sea of the Russian Federation)	Fee rate (rubles per 1 thousand cubic meters of water resources)
<b>Seas:</b>	
Azov	14,88
Baltic	8,28
Barents Sea	6,36
White	8,4
Bering	5,28
East Siberian	4,44
Karskoe	4,8
Caspian	11,52
Laptev	4,68
Okhotsk	7,68
Black	14,88
Chukotka	4,32
Japanese	8,04
Pacific ocean	5,64

*III. Rates of payment for the use of water bodies or their parts without taking (withdrawing) of water resources for the purposes of electric energy production*

River basins	Fee rate (rubles per 1 thousand kWt / hour of electricity)
Amur	9,24
Angara and Lake Baikal basin	14,52
Volga	10,82
Don	10,69
Yenisei	15,07

Kuban	9,77
Lena	13,5
Ob	13,53
Rivers of the Baltic Sea basin	9,77
Rivers of the Barents Sea basin	9,64
Rivers of the White Sea basin	9,9
Rivers of the Bering, East Siberian, Chukchi and Japanese Seas basins, as well as the Pacific Ocean	10,44
Sulak	7,92
Terek	9,24
Ural	9,37
Other rivers	5,28

*IV. Rates of payment for the use of the water area of surface water bodies or their parts*

Water bodies	Fee rate (thousand rubles per 1 sq. km of used water area per year)
1. River basins:	
Amur	313,2
Volga	304,8
Don	344,4
Yenisei	282
Kuban	344,4
Lena	313,2
Ob	302,4
river basin of the Baltic Sea	339,6
rivers of the Barents Sea basin	321,6
rivers of the White Sea basin	321,6
rivers of the basins of the Bering, East Siberian, Chukchi and Japanese Seas, as well as the Pacific Ocean	313,2
Samur, Sulak	344,4
Terek	344,4
Ural	320,4
other rivers	320
2. Lakes:	
Baikal	282
Beloe, Vygozero, Ilmen, Pskovskoye, Chudskoye	339,6
Ladoga, Onega	339,6
other lakes	320

Water bodies	Fee rate (thousand rubles per 1 sq. km of used water area per year)
3. Seas (within the territorial sea of the Russian Federation):	
Azov	448,8
Baltic	338,4
Barents Sea	307,2
White	277,2
Bering	261,6
East Siberian, Kara, Laptev, Chukchi	157,2
Caspian	422,4
Okhotsk, Japanese	385,2
Black	498
4. Pacific Ocean (within the territorial sea of the Russian Federation)	292,8

Please note there are additional coefficients identified in Decree of the Government of the Russian Federation No. 1509 of December 26, 2014 "On the Rates of payment for the Use of Water Bodies in Federal Ownership and Amendments to Section I of the rates of payment for the use of water bodies in Federal Ownership". Those are necessary to be applied respectfully for each year of calculation:

in 2021 with a coefficient of 2.66;

in 2022 with a coefficient of 2.93;

in 2023 with a coefficient of 3.22;

in 2024 with a coefficient of 4.05;

in 2025 with a coefficient of 4.65;

starting from 2026 with the coefficient determined in accordance with this subparagraph for the year preceding the year of the payment period multiplied by the coefficient taking into account the actual change (on average for the year) in consumer prices for goods (works, services) in the Russian Federation, determined by the Ministry of Economic Development of the Russian Federation in accordance with the data of state statistical reporting for the second consecutive year preceding the year of the payment period;



**Annex 4. Typical pre HSE audit questionnaire (general questions only)****1. General information**

- ✓ Company name, actual and legal address, tel., fax number, e-mail address
- ✓ Describe the main and auxiliary parts of facility, distance (km) between main facilities
- ✓ Number of employees (management, employees of main and auxiliary facilities)
- ✓ Structure of management
- ✓ Facilities location: in relation to neighbor settlements, other industrial facilities, social infrastructures and legally protected natural areas (including water bodies)

**2. Legal status of land using**

- ✓ Complete list of land allotments used by enterprise (taking into account long and short term contracts), indicating land use certificates

**3. Description of historical environmental impacts on the site**

- ✓ Historical use of the area currently occupied by enterprise
- ✓ Is there any information about environmental pollution, took place before enterprise's activity (specify, if any)?
- ✓ History of enterprise's development by stages, dates of commissioning of the main facilities
- ✓ What facilities have been decommissioned (e.g. water mains, workshops, artesian wells)? Indicate its current status: suspended, demolished, abandoned etc.
- ✓ List of recorded fires or any other emergency situations on the site over last 5 years (taking into account quantitative characteristics, references to legal documents).

**4. Facilities and operations, output**

- ✓ General description of the main operations (production, assembly, transporting, shipping) by facilities.
- ✓ Main environmental hazardous activities and operations on the site
- ✓ Annual capacity output. Estimated short term dynamic of production.
- ✓ Auxiliary process facilities: general description of technology processes
- ✓ Technical upgrading and refurbishment plans (except for current ones). Brief list of planned construction and reconstruction facilities

**5. Energy-consumption and energy-saving**

- ✓ External sources of energy supply (describe main energy consumers, specifying the limits and actual consumption over the last three years).
- ✓ Own sources of electricity supply (indicate recipients, input and output capacity over the last three years)
- ✓ External sources of heat supply (utilities). Indicate consumers, specifying the limits and actual consumption over the last three years
- ✓ Own sources of heat supply (Indicate recipients, input and output capacities over last three years).
- ✓ Volumes of fuel consumed by own sources of electrical- and heat supplies (accounting types of fuel) (if any).
- ✓ List (plan) of actions on energy efficiency and energy saving.

**6. Raw materials**

- ✓ List of basic raw materials used at the enterprise. Indicate volumes of annual consumption and provisional volumes of current stocks at the enterprise for each item.
- ✓ List of hazardous materials used at enterprise (if any). Indicate places and ways of storage, measures to prevent from entry into environment
- ✓ Raw materials storage places.
- ✓ Indicate storage methods
- ✓ Delivery techniques to places of storage, loading and unloading, on-site transportation of raw materials (including hazardous materials).
- ✓ Availability of own pits of building materials (sand, gravel).

**7. Toxic substances**

- ✓ Information on electric transformer stations onsite
- ✓ Describe process of storage after decommissioning, changing oil.
- ✓ Use of asbestos containing materials? If yes, specify volumes. Where are used now?
- ✓ Use of freons. Specify quantity and types of freons
- ✓ Use of compressed gases. Provide details.

**8. Air emission**

- ✓ Availability of inventory sources of emission (specify executor, completion date, date of agreed with state environmental control agency)
- ✓ Availability of project Maximal permissible emissions (MPE) and emission permits
- ✓ Sizes of sanitary protective zone (normative and actual)
- ✓ Availability of form 2-TP (air) of statistical reporting at the enterprise.
- ✓ Availability of emission control at sources, work areas and at the boundary of sanitary protective zones. Specify responsible persons, measures and periodicity of the control, place of check analysis, measures of fixing of its, take-off data. if own laboratories is available identify certification documents, date of calibration of instruments. Data of recorded emergency emission for last 3 years.
- ✓ Identify characteristics of air cleaning equipment (designed and actual efficiency, registers #, availability of maintenance service)
- ✓ Identify action plans realized since last MPE book was approved (at list last three years). Whether are caring out measures in period of unfavorable meteorological conditions? Estimate efficiency of this measures.
- ✓ Availability of recorded public complaints about air pollution by enterprise

**9. Water consumption and water disposal**

- ✓ Independent sources of industrial water supply (Indicate recipients at the enterprise). Assign copies of licenses, data on organization of water protective zones, to specify limits of consumption, the rate of payments and actual annual volumes of water consumption from each source for last 3 years. Assign data on means of the account of water consumption. To specify the closure of the well sources (if are available).
- ✓ Sources of public water supply for industrial needs (if are present - to indicate with whom and for what term there are agreements, limits of consumption, rate of payments and actual consumption for last 3 years).
- ✓ Independent sources of potable water supply (point to supplied of every source at the enterprise). Submit copies of licenses, data on the organization of sanitary protection zones.
- ✓ Sources of public potable water supply.
- ✓ Sewage and Storm water details
- ✓ Whether are using underground sources for water supply of enterprise? If yes to present copies of li- censes, passports of wells, data on limits water consumption, means of the account of water consumption (and their checking's), about arrangement of zones sanitary protection.
- ✓ Availability of form 2-TP (water) of statistical reporting at the enterprise.
- ✓ Whether there are discrepancy be- tween statistical reporting and waste discharge permits?
- ✓ Balance of water consumption and water removal
- ✓ Whether is carried out control over industrial and utility sewage at the enterprise. If yes to indicate executors (if own laboratory – to specify certification documents), measures and periodicity of the control, place of check analysis, measures of fixing of its.
- ✓ Specify if available of surface water quality monitoring system. if yes, to present program, executor (if own laboratory – to specify licenses and certifications), annual average and maximum concentration of pollutants above and low of river flow in comparison with MPC.
- ✓ Plans of water-protective measures, approved and carried out when the last permission of effluents discharge was received (in case of recent reception of such permission - at least for 3 years).

**10. Cisterns (AST and UST)**

- ✓ Structure of reservoir park. To indicate location for each reservoir, con- structed date, material

it was made, capacity, what is storing (have been stored earlier) availability of protection (dikes, secondary containment) from leaking and spills

- ✓ Regulation of technical inspections of reservoirs

### **11. Waste generation and waste disposal**

- ✓ List of waste at the enterprise (names, amount, class of hazardous, last inventory date, executor)
- ✓ Availability of Draft Waste Generation Standards and Waste Disposal Limits, permit for waste disposal (to specify executor, date of fulfillment, date of receive)
- ✓ The list of places of waste disposal at enterprises area (specify waste nomenclatures for each of places).
- ✓ Availability not-inventory type of waste, places of temporary waste storage. Specify full list of its and characteristics.
- ✓ List of waste transferring to other organizations to remove from enterprises area. Specify amounts of waste and other conditions of waste contracts
- ✓ Whether is carried out illegal waste discharge (causes, nomenclature, volumes)
- ✓ Availability of enterprise's landfills. If yes, to specify its location, licenses, squares, time of maintenance, nomenclature of waste, compliance with regulatory requirements. Specify places of waste disposal and amount of toxic waste (in additional with map)
- ✓ Whether is carried out waste treatment at the enterprise? If yes to specify license, nomenclature of waste, amounts (for year), technologies.
- ✓ Availability of form 2-TP (water) of statistical reporting at the enterprise. Whether there are discrepancy between statistical reporting and waste discharge permits?
- ✓ Plans of measures on decrease quantity of waste, approved and carried out when the last permission of waste disposal (in case of recent reception of such permission – at least for 3 years). Efficiency of conducted actions.

### **12. Physical factors of environmental impacts**

- ✓ Specify facilities of enterprise where noise level at the boundary of sanitary protective zones exceed standards approved in RF. Specify causes and quantity, measures to decrease noise level
- ✓ Whether is carried out noise measurements at the boundary of sanitary protective zones? If yes to specify executor, measures and periodicity of the control, place of check analysis, measures of fixing of its.
- ✓ Indicate other exceeding physical factors (electromagnetic fields, vibrations etc.), causes and quantity, measures.

### **13. Soil and ground water contamination**

- ✓ List of recorded spills of hazardous chemical substances (quantity, with references to documents) for 5 years
- ✓ Data of amount and square of contaminated area. Identify applicable measures of cleaning, containment, plan of action for accident spills.
- ✓ Plans of action for reclamation of contaminated ground, guidelines and other regulation documents (if are)
- ✓ Whether is carried out soil and ground water monitoring? If yes, to specify executors (if own laboratories available –specify certification documents), measures and periodicity of the control, place of check analysis, measures of fixing of its.
- ✓ Availability of recorded public complaints about ground water contaminated and soil at neighboring area

### **14. Enterprise development**

- ✓ List of sites at the enterprise, where construction/reconstruction is carrying out. Indicate degree of completeness of construction/reconstruction for each site
- ✓ Availability of permits by agency of state environmental control to construction/reconstruction for each site (including State Environmental Expert Review)

### **15. Land protection. Reclamation**

- ✓ Availability of Plan to reclamation of disturbed land

- ✓ Data on land reclaimed, and plans for reclamation 3 years (reference to acceptance acts).
  - ✓ Whether is carrying out deforestation by enterprise? If yes, specify availability of permits.
- Whether is carrying out measures on reforestation
- ✓ Communications and relations with agencies of state environmental control regarding reclamation of soil under construction and reconstruction sites at enterprise. Specify data on square of reclaimed, and need to be reclaim land (reference to acceptance acts).
  - ✓ List of reclamation works contained
  - ✓ in projects of construction / reconstruction at enterprise

#### **16. Enterprise's environmental policy**

- ✓ Availability of document regarding general guidelines of environmental policy. To present a copy.
- ✓ Environmental protection plans for 3 years. Data about actual fulfillment of this plans, costs, consequences.
- ✓ Availability of environmental training program for workers. Specify trainings plans, periodicity, contingent and number of trainees

#### **17. Accident prevention**

- ✓ Requirements of equipment service to prevent accident (basic problem, type of equipment to inspection checks, frequency of inspections)
- ✓ Automated Management systems, signaling, emergency shutdown of main and auxiliary equipment Hazardous substances spill response
- ✓ plan and emergency accident plan. Availability of equipment to clean of spills, training (specify periodicity, responsible persons).
- ✓ Compliance of fire protection measures, with regulation requirements.
- ✓ Service of industrial environmental control. Availability of own chemical lab, its certification, own service of emergency situations.
- ✓ Measures of internal information and external affairs

#### **18. Order of requirements of the environmental protection legislation and agencies of state environmental control**

- ✓ Payments for emissions, dumps, waste disposal within limits and for extra-limits quantities (for last 3 years).
- ✓ Sanction in relation to enterprise or its workers for infringement of the environmental protection legislation (for last 3 years). Indicate particularly, referring to corresponding acts, Decrees, instructions.
- ✓ Appropriate environmental payment/fines
- ✓ Availability any restrictions to enterprise's activity (vicinity to specially protected environmental areas, residents at sanitary protection zone etc.)
- ✓ Availability of public complaints
- ✓ about violation of environmental regulations for 5 last years. Give instance of complaints and measures
- ✓ Addresses, phone numbers, names of managers and inspectors of agencies of state environmental and sanitary epidemiological control under enterprise's activity

#### **19. Contractor relationship**

- ✓ Liability of the parties for environmental effects of contractor's works
- ✓ Industrial environmental control to contractor's works
- ✓ Measures to contractors if they infringement of obligations about environmental issues.

#### **19. Climate characteristic**

- ✓ Geological characteristic
- ✓ hydrological characteristic
- ✓ Hydrogeological characteristic
- ✓ Geobotanical and zoogeographical characteristic
- ✓ Specially protected areas in vicinity of enterprise
- ✓ Brief data, if there are, including data of construction/reconstruction projects

---

**20. Occupational safety and health**

- ✓ Identify main activities and operations associated with hazardous for workers
- ✓ Personal protective equipment and safety measures in accordance with regulatory requirements and current practice
- ✓ Safety training programs Occupational diseases statistic
- ✓ Emergencies and major operational failures statistic
- ✓ Accidents and occupational traumatism statistic
- ✓ Prescriptions of State control agencies
- ✓ Air quality, noise level, other physical agents (vibration, electromagnetic rays, temperature-humidity conditions) at workplaces (standards and current practice). Measures to eliminate breaches
- ✓ Assurance of fire safety
- ✓ Assurance of general safety (area's security)

**21. Quality of production**

- ✓ General data on environmental safety of production
- ✓ Availability of required certifications
- ✓ Availability of voluntary certifications (ISO 14001, ISO 9001-9004)

## **Annex 5. Sanitary classification of industrial facilities and production thermal power plants, warehouse buildings and structures and the size of the approximate sanitary protection zones for them**

*Extract from SanPiN. 2.2.1/2.1.1.1200-03 "Sanitary protection zones and sanitary classification of enterprises, structures and other objects"*

For industrial facilities and production facilities, structures, which have negative impact on the environment and human health, depending on the capacity, operating conditions, nature and amount of contaminating substances, noise, vibration and other harmful physical factors, as well as taking into consideration the envisaged measures to reduce their adverse effects on the environment and human health in accordance with the sanitary classification of industrial objects and production facilities establishes the following approximate dimensions of sanitary protection zones

- industrial facilities and production of the first class - 1000 m;
- industrial facilities and production of the second class - 500 m
- industrial facilities and production of the third class - 300 m
- industrial engineering and production fourth grade - 100 m
- industrial facilities and production of the fifth class - 50 m

### **7.1. Industrial facilities and production.**

#### **7.1.1. Chemical facilities and production**

##### **CLASS I - sanitary protection zone 1000 m.**

1. Production of bound nitrogen (ammonia, nitric acid, nitrogen-tuk and other fertilizers).

Plants for the production of ammonia, nitrogen-containing compounds (urea, thiourea, hydrazine and its derivatives, etc.), nitrogen-tuk, phosphate, concentrated mineral fertilizers, nitric acid, etc. require an expanded sanitary protection zone determined in accordance with the requirements of this regulatory document.

2. Production of products and intermediates of aniline-colorful industry of benzene and ether series - aniline, nitrobenzene, nitroaniline, alkylbenzene, nitrochlorobenzene, phenol, acetone, chlorobenzene, etc.

3. Production of intermediates naphthalene and anthracene series - beta-naphthol, escolate, phenylpiracetam, pertelote, anthraquinone, phthalic anhydride, etc.

4. Production of cellulose and semi-cellulose by acidic sulfite and bisulfite or mono sulfite methods based on the combustion of sulfur or other sulfur-containing materials, as well as the production of cellulose by sulfate method (sulfate-cellulose).

5. Production of chlorine by electrolytic, semi-products and chlorine-based products.

6. Production of rare metals by chlorination (titanium, magnesium, etc.).

7. Production of artificial and synthetic fibers (viscose, capron, and cellophane).

8. The production of dimethyl terephthalate.

9. Caprolactam production.

10. Production of carbon disulfide.

11. Production of products and intermediates for synthetic polymeric materials.

12. Production of arsenic and its compounds.

13. Production of oil refining, associated petroleum and natural gas.

In the processing of hydrocarbon raw materials with content of sulfur higher than 1% (by weight) of sanitary protection zone should be reasonably increased.

14. Production of picric acid.

15. Production of fluorine, hydrogen fluoride, semi-products and products based on them (organic, inorganic).

16. Enterprises for processing of oil shale.

17. Production of soot.



18. Production of phosphorus (yellow, red) and organophosphorus compounds (thiophos, carbophos, mercaptophos, etc.).
19. Production of superphosphate fertilizers.
20. Production of calcium carbide, acetylene from calcium carbide and acetylene-based derivatives.
21. Production of artificial and synthetic rubber.
22. Production of hydrocyanic acid, organic intermediates and products based on it (acetontiangidrine, ethylene cyanide, ethers of methacrylic and acrylic acids, diisocyanates, etc.); production of cyanide salts (potassium, sodium, copper, etc.), cyanide, dicyanamide, calcium cyanamide.
23. Production of acetylene from hydrocarbon gases and products based on it.
24. Production of synthetic chemical, pharmaceutical and medicinal products.
25. Production of synthetic fatty acids, higher fatty alcohols by direct oxygen oxidation.
26. Production of mercaptans, centralized installation of gas odorization mercaptans, warehouses odorant.
27. Production of chromium, chromium anhydride and salts based on them.
28. Production of esters.
29. Production of phenol-formaldehyde, polyester, epoxy and other artificial resins.
30. The production of methionine.
31. Production of metal carbonyls.
32. Production of bitumen and other products from residues of coal tar distillation, oil, needles (tar, semi-tar, etc.).
33. Production of beryllium.
34. Production of synthetic alcohols (butyl, propyl, isopropyl, amyl).
35. Industrial facility for hydrometallurgy of tungsten, molybdenum, cobalt.
36. Production of feed amino acids (feed lysine, premixes).
37. Production of pesticides.
38. Production of ammunition, explosives, warehouses and landfills.
39. Production of aliphatic amines (mono-di-tri-methylamines, diethyl-triethylamines, etc.) and products for their coal gasification.

#### **Class II - sanitary protection zone 500 m.**

1. Production of bromine, semi-products and products based on it (organic, inorganic).
2. The production of gases (coal, water, producer, oil).
3. Underground coal gasification stations.
4. Production of organic solvents and oils (benzene, toluene, xylene, naphthol, cresol, anthracene, phenanthrene, acridine, carbosol, etc.).
5. Production of processing of coal and products based on it (coal pitch, resins, etc.).
6. Production of chemical processing of peat.
7. Production of sulfuric acid, oleum, sulfur dioxide.
8. Production of hydrochloric acid.
9. Production of synthetic ethyl alcohol by sulfuric acid method or direct hydration method.
10. Production of phosgene and products based on it (vapors, etc.).
11. Production of acids: aminoanisoic, aminoundecanoic, aminoalkanoic, codevariable, isophthalic.
12. Manufacture of sodium nitrite, thionyl chloride, ammonium carbonate salts, ammonium carbonate.
13. Production of dimethylformamide.
14. Production of ethyl liquid.
15. Production of catalysts.
16. Production of organic sulphurous dyes.
17. Production of potassium salts.
18. Production of artificial leather using volatile organic solvents.



19. Manufacture of VAT dyes of all classes isotalo and Atamanov.
20. Production of ethylene oxide, propylene oxide, polyethylene, polypropylene.
21. Production of 3,3-di(chloromethyl)oxacyclobutane, polycarbonate, copolymers of ethylene and propylene, polymers of higher polyolefins on the basis of associated petroleum gas.
22. Production of plasticizers.
23. Plastics based on PVC.
24. Points of cleaning, washing and steaming of tanks (during transportation of oil and oil products).
25. Production of synthetic detergents.
26. Production of household chemicals in the presence of production of raw materials.
27. Production of boron and its compounds.
28. Production of paraffin.
29. The production of tar, liquid and volatile cuts of wood, methanol, acetic acid, turpentine, carpeting oils, acetone, creosote.
30. Production of acetic acid.
31. Production of acetyl-cellulose with raw materials production of acetic acid and acetic anhydride.
32. Hydrolytic production on the basis of processing of vegetable raw materials with pantothenic.
33. Production isoactive alcohol, and oil aldehyde, butyric acid, vinyl-toluene, foam, polyvinyl-toluene, due, recovery of organic acids (acetic, butyric, etc.), methyl-pyrrolidone, polyvinylpyrrolidone, pentaerythritol, hexamine, formaldehyde.
34. Production of nylon and Dacron fabric.
35. Natural gas liquefaction plants located on gas pipelines, fields and gas distribution stations of main gas pipelines with the volume of liquefied natural gas storage from 1000 m .

### **CLASS III - sanitary protection zone 300 m.**

1. The production of niobium.
2. Production of tantalum.
3. Production of soda ash by ammonia method.
4. Production of ammonium, potassium, sodium, calcium nitrate.
5. Production of chemical reagents.
6. Production of plastics from cellulose esters.
7. Production of corundum.
8. Production of barium and its compounds.
9. Production of ultramarine.
10. Production of fodder yeast and furfural from wood and agricultural waste by hydrolysis.
11. Nicotine production.
12. Production of synthetic camphor isomerization method.
13. Production of melamine and cyanuric acid.
14. Production of polycarbonate.
15. Production of mineral salts, except arsenic, phosphorus, chromium, lead and mercury.
16. Production of plastics (Carbolite).
17. Production of phenol-formaldehyde press materials, pressed and winding paper products, fabrics based on phenol-formaldehyde resins.
18. The production of artificial mineral dyes.
19. Enterprise for the regeneration of rubber and rubber products.
20. Manufacture of tires, rubber products, ebonite, glued shoes, as well as rubber compounds for them.
21. Chemical processing of ores of rare metals to obtain salts of antimony, bismuth, lithium, etc.
22. Production of coal products for the electrical industry (brushes, electric carbon, etc.).
23. Production of vulcanization of rubber.
24. Production and basic warehouses of ammonia water.

25. Production of acetaldehyde by vapor-phase method (without the use of metallic mercury).
26. Production of polystyrene and styrene copolymers.
27. Production of organosilicon varnishes, liquids and resins.
28. Gas distribution stations of main gas pipelines with mercaptan odorization plants.
29. Production of sebacic acid.
30. Production of vinyl acetate and products based on it (polyvinyl acetate, polyvinyl acetate emulsion, polyvinyl alcohol, viniflex, etc.).
31. Production of varnishes (oil, alcohol, printing, insulating, for the rubber industry, etc.).
32. Production of vanillin and saccharin.
33. Production of compressed and liquefied separation products.
34. Production of technical salomas (with the production of hydrogen by non-electrolytic method).
35. The production of perfumes.
36. Production of artificial leather based on polyvinyl chloride and other resins without the use of volatile organic solvents.
37. Production of epichlorohydrin.
38. The production of compressed nitrogen, and oxygen.
39. Production of fodder yeast.
40. Production of refined petroleum products in installations with steam evaporation and a capacity of not more than 0.5 t/hour for processed raw materials.
41. Production of synthetic resins with a capacity of up to 400 thousand tons per year in kind and formalin on an oxide catalyst up to 200 thousand tons per year.
43. Natural gas liquefaction plants located on gas pipelines, fields and gas distribution stations of main gas pipelines with the volume of liquefied natural gas storage from 250 to 1000 m .

**CLASS IV - sanitary protection zone 100 m.**

1. Production of mixtures.
2. Production of processing of fluoropolymers.
3. Manufacture of paper from ready pulp and rags.
4. Production of glycerin.
5. Production of galalite and other protein plastics (aminoplasts, etc.).
6. Production of enamels on condensation resins.
7. Soap manufacture.
8. The production of salt.
9. Production of pharmaceutical potassium salts (chloride, sulfuric acid, potash).
10. Production of natural mineral (chalk, ochre, etc.) paints.
11. The production of tanning extract.
12. Printing ink plants.
13. Production of photochemical (photo paper, photographic plates, photo and film).
14. Production of household chemicals from ready-made raw materials and warehouses for their storage.
15. Production of drying oil.
16. The manufacture of glass.
17. Production of medical glass (without mercury).
18. Production of plastics processing (casting, extrusion, pressing, vacuum molding).
19. Production of polyurethanes.
20. Natural gas liquefaction plants located on gas pipelines, fields and gas distribution stations of main gas pipelines with the volume of liquefied natural gas storage from 50 to 250 m .

**CLASS V - sanitary protection zone 50 m.**

1. Production of finished dosage forms (without manufacturing components).
2. Production of paper from waste paper.
3. Production of products from plastic and synthetic resins (machining).
4. Production of carbon dioxide and "dry ice".

5. Production of artificial pearls.
6. Manufacture of matches.
7. Natural gas liquefaction plants located at automobile gas-filling compressor stations, gas pipelines, fields and gas distribution stations of main gas pipelines, with the volume of liquefied natural gas storage up to 50 m.

### **7.1.2. Metallurgical, machine-building and metal-working facilities and production**

#### **CLASS I - sanitary protection zone 1000 m.**

1. Iron and steel works with a full metallurgical cycle of more than 1 million tons/year of iron and steel.

Large capacities require additional justification of the necessary excess minimum sanitary protection zone.

2. Production of secondary processing of non-ferrous metals (copper, lead, zinc, etc.) in an amount of more than 3000 t/year.

3. Production of iron smelting directly from ores and concentrates with the total volume of blast furnaces up to 1500 m.

4. Steel production open-hearth furnace and Converter methods with the plants for waste processing

5. Production of smelting of non-ferrous metals directly from ores and concentrates (including lead, tin, copper, Nickel).

6. Production of aluminum by electrolysis of molten aluminum salts (alumina).

7. Production speculums smelting; ferroalloys production.

8. Production of agglomeration of ores of ferrous and non-ferrous metals and pyrite.

9. Production of alumina (aluminum oxide).

10. Production of mercury and devices with mercury (mercury rectifiers, thermometers, lamps, etc.).

11. Coke production (coke gas).

#### **CLASS II - sanitary protection zone 500 m.**

1. Production of iron melting with the total volume of blast furnaces from 500 to 1500 m.

2. Iron and steel works with a full metallurgical cycle capacity of up to 1 million tons/year of iron and steel.

3. Production of steel by open-hearth, electric smelting and Converter methods with waste processing plants with the production of main products in the amount of up to 1 million tons/year.

4. Magnesium production (in all ways except the chloride).

5. Production of cast iron shaped casting in the amount of more than 100 thousand tons/year.

6. Production of coke burning.

7. Production of lead-acid batteries.

8. Production of aircraft, maintenance.

9. Car production.

10. Production of steel structures.

11. Production of cars with foundry and painting shops.

12. Enterprises for secondary processing of non-ferrous metals (copper, lead, zinc, etc.) in an amount of 2 to 3 thousand tons/year.

#### **CLASS III - sanitary protection zone 300 m.**

1. Production of non-ferrous metals in quantities from 100 to 2000 t/year.

2. Production grinding.

3. Production of antimony by pyrometallurgical and electrolytic methods.

4. Production of cast iron shaped casting in an amount of 20 to 100 thousand tons/year.

5. Production of zinc, copper, Nickel, cobalt by electrolysis of aqueous solutions.

6. The production of metal electrodes (with manganese).

7. Production of shaped non-ferrous injection molding with a capacity of 10 thousand tons/year (9500 tons of injection molding from aluminum alloys and 500 tons of casting from zinc alloys).

8. Production of phosphors.

9. Hardware production.
10. Production of sanitary products.
11. Production of meat and dairy engineering.
12. Production of mine automation.
13. Metal type letters plants (when possible lead emissions).
14. Production of bare cable.
15. Production of alkaline batteries.
16. Production of hard alloys and refractory metals in the absence of shops of chemical processing of ores.
17. Ship repair enterprise.
18. Production of iron smelting with the total volume of blast furnaces less than 500 m.
19. Production of aluminum recycling up to 30 thousand tons per year using drum furnaces for melting aluminum and rotary furnaces for melting aluminum chips and aluminum slag.

#### **CLASS IV - sanitary protection zone 100 m.**

1. The production of enrichment of metals without heat treatment.
2. The cable production with leaded or rubber insulation.
3. Production of cast iron shaped casting in the amount of 10 to 20 thousand tons/year.
4. Industrial facilities for the recycling of non-ferrous metals (copper, lead, zinc, etc.) in an amount up to 1000 t/year.
5. Production of heavy presses.
6. Production of machines and devices of the electrical industry (dynamometers, capacitors, transformers, spotlights, etc.) in the presence of small foundries and other hot shops.
7. Production of devices for the electrical industry (electric lamps, lanterns, etc.) in the absence of foundries and without the use of mercury.
8. Production on repair of road cars, cars, bodies, rolling stock of railway transport and underground.
9. Production of coordinate boring machines.
10. Production of Metalworking industry with cast iron, steel (up to 10 thousand tons/year) and color (up to 100 tons/year) casting.
11. Production of metal electrodes.
12. Metal type letters plants (without emissions of lead).
13. Polygraphic combine.
14. Printing houses with the use of lead.
15. Machine-building enterprises with Metalworking, painting without casting.

#### **CLASS V - sanitary protection zone 50 m.**

1. Production of boilers.
2. Production of pneumatic.
3. Production of metal stamp.
4. Production of agricultural products.
5. Printing houses without the use of lead (offset, computer set).

### **7.1.3. Mining of ores and non-metallic minerals**

#### **CLASS I - sanitary protection zone 1000 m.**

1. Industrial facilities for oil production with the release of hydrogen sulfide from 0.5 to 1 t/day, as well as with a high content of volatile hydrocarbons.
2. Industrial facilities for the extraction of polymetallic (lead, mercury, arsenic, beryllium, manganese) ores and rocks VIII-XI category open development.
3. Industrial facilities for the extraction of natural gas.

Note: For industrial facilities for the extraction of natural gas with a high content of hydrogen sulfide (more than 1.5-3%) and mercaptans, the size of SPZ is set at least 5000 m, and with a hydrogen sulfide content of 20% or more - up to 8000 m.

4. Coal cut.
5. Objects for the extraction of oil shale.
6. Mining and processing plants.

**CLASS II - sanitary protection zone 500 m.**

1. Industrial facilities for the extraction of asbestos.
2. Industrial facilities for the extraction of iron ore and rocks open development.
3. Industrial installations for the extraction of metalloids in an open way.
4. Dumps and sludge collectors in the extraction of non-ferrous metals.
5. Careers of nonmetallic building materials.
6. Mine waste heaps without the measures for the suppression of spontaneous combustion.
7. Objects for the extraction of gypsum.

**CLASS III - sanitary protection zone 300 m.**

1. Industrial facilities for oil production with the release of hydrogen sulfide up to 0.5 t/day with a low content of volatile hydrocarbons.
2. Industrial facilities for the extraction of phosphorites, apatites, pyrites (without chemical treatment), iron ore.
3. Industrial facilities for the extraction of rocks VI-VII category of Dolomites, magnesites, asphalt tars open development.
4. Industrial facilities for the extraction of peat, stone, brown and other coals.
5. Production of briquette from small peat and coal.
6. Hydrochory and concentrator with a wet beneficiation process.
7. Industrial facilities for the extraction of rock salt.
8. Industrial facilities for the extraction of peat milling method.
9. Dumps and sludge collectors in the extraction of iron.
10. Industrial facilities for mining of metal ores and metalloids, except for lead ores, mercury, arsenic and manganese.

**CLASS IV - sanitary protection zone 100 m.**

1. Industrial facilities (quarries) for the extraction of marble, sand, clay with the shipment of raw materials by conveyor belt.
2. Industrial facilities (quarries) for the extraction of potassium carbonate open development.

**7.1.4. Construction industry****CLASS I - sanitary protection zone 1000 m.**

1. Production of magnesite, dolomite and fireclay from firing in a mine, etc. rotary kilns.
2. Production of asbestos and products from it.

**CLASS II - sanitary protection zone 500 m.**

1. Cement manufacturing (Portland seaporter-pozzolan cement, etc.), as well as local cements (clenicamente, Roman cement, slag, etc.).
2. Production of asphalt concrete in stationary plants.
3. Production of gypsum (alabaster).
4. Production of lime (lime plants with mine and rotary kilns).

**CLASS III - sanitary protection zone 300 m.**

1. Production of artistic casting and crystal.
2. Production of glass wool and slag wool.
3. Production of crushed stone, gravel and sand, enrichment of quartz sand.
4. Production of roofing felt and roofing material.
5. Production of ferrites.
6. Production of construction materials.
7. Production of brick (red, silicate), building ceramic and refractory products.
8. The suction bulk cargo crane method.
9. House building factory.
10. Production of reinforced concrete products (concrete, concrete).
11. Production of artificial aggregates (expanded clay, etc.).
12. Production of artificial stones.
13. Silos of cement and other dusty construction materials.
14. Production of building materials from waste CHP.

15. Industrial facility for the production of concrete and concrete products.
16. Production of porcelain and faience products.
17. Completely.
18. Production of processing of natural stones.
19. Industrial facilities for the extraction of stone is not explosive.
20. Production of gypsum products, chalk.
21. Production of fibrolite, reed, straw, trim, etc.
22. Production of construction parts.
23. Bituminous installations.

**CLASS IV - sanitary protection zone 100 m.**

1. Production of clay products.
2. Glass, mirror-production, polishing and pot glass.
3. Mechanical processing of marble.
4. Quarries, enterprises for the extraction of gravel, sand, clay.
5. Installation for the production of concrete.

**7.1.5. Wood processing**

**CLASS I - sanitary protection zone 1000 m.**

1. Forest chemical complexes (production of chemical processing of wood and charcoal).

**CLASS II - sanitary protection zone 500 m.**

1. The production of charcoal (pleomele furnace).

**CLASS III - sanitary protection zone 300 m.**

1. Production of wood preservation (impregnation).
2. Production of sleepers and their impregnation.
3. Manufacture of articles of fur wood: chipboards, wood-fiber plates, using as a binder of synthetic resins.
4. Woodworking industry.

**CLASS IV - sanitary protection zone 100 m.**

1. Production of coniferous-vitamin flour chlorophyll-carotene paste, coniferous extract.
2. Of the sawmill, plywood and wooden parts of goods.
3. Shipyards for the manufacture of wooden ships (boats).
4. Production of wood wool.
5. Furniture Assembly with varnishing and painting.

**CLASS V - sanitary protection zone 50 m.**

1. Production notation.
2. Production of cooperage products from finished riveting.
3. Manufacture of basket-weaving.
4. Manufacturing preservation wood salt and water solutions (without salts arsenic) supermascot.
5. Furniture Assembly of finished products without the varnishing and paint.

**7.1.6. Textile and light industry production**

**CLASS I - sanitary protection zone 1000 m.**

1. Production of primary processing of cotton with the device shops for processing seeds with mercury-organic preparations.

**CLASS II - sanitary protection zone 500 m.**

1. Manufacture of primary processing of plant fibers: cotton, flax, hemp, kendara.
2. Production of artificial leather and film materials, oilcloth, plastic skin using volatile solvents.
3. Production of chemical impregnation and processing of fabrics with carbon disulfide.

**CLASS III - sanitary protection zone 300 m.**

1. Production of continuous impregnation of fabrics and paper with oil, oil-asphalt, bakelite and other varnishes.
2. Production for the impregnation and treatment of fabrics (leatherette, granitol, etc.) chemicals, with the exception of carbon disulphide.



3. Production of polyvinyl chloride unilaterally reinforced films, films of combined polymers, rubbers for the bottom of shoes, regenerate using solvents.
4. Spinning and weaving production.
5. The manufacture of footwear with nylon, etc. injection.
6. Bleaching and dyeing-appreture production.

**CLASS IV - sanitary protection zone 100 m.**

1. Production of yarn and fabrics from wool, cotton, linen, as well as in a mixture with synthetic and artificial fibers in the presence of dyeing and bleaching shops.
2. Production of haberdashery-leather cardboard with polymer finishing using organic solvents.
3. Items for acceptance of raw cotton.
4. Clothing manufacture.
5. Hosiery production.
6. Production of sports products.
7. Fabric printing production.
8. Production of accessories.
9. Footwear production.

**CLASS V - sanitary protection zone 50 m.**

1. Production coconino.
2. Production kokono-razvedochnye and chelkarskoye.
3. The production of melange.
4. The production of hemp and galactocel, rope, twine, rope, and processing ends.
5. Production of artificial Doodle.
6. Production of yarn and fabrics from cotton, linen, wool in the absence of dyeing and bleaching shops.
7. Production of knitted and lace.
8. Silk production.
9. Carpet production.
10. Production of Shoe boards on leather and leather-cellulose fiber without the use of solvents.
11. Bobbin and bobbin production.
12. Wallpaper production.
13. Production of small-scale production of shoes from finished materials using water-soluble adhesives.

**7.1.7. Processing of animal products**

**CLASS I - sanitary protection zone 1000 m.**

1. Production of adhesives, for the production of glue from leather residues, field and landfill bones and other animal waste.
2. Production of technical gelatin from field rotted bone, skin residues and other animal waste and waste with storage of them in the warehouse.
3. Industrial facilities for processing of fallen animals, fish, their parts and other animal waste and waste (transformation into fats, animal feed, fertilizers, etc.).
4. Production osteomyelitis and costamolino.

**CLASS II - sanitary protection zone 500 m.**

1. Production of technical fat.

**CLASS III - sanitary protection zone 300 m.**

1. Central warehouses for the collection of waste materials.
2. Production of raw fur skins of animals and dyeing (sheepskin, sheepskin-tanning, fur), production of suede, Morocco.
3. Processing raw animal skins: leather and rawhide, leather-tanning with the waste.
4. Production of skeletons from the corpses of animals.
5. Feed mills (production of animal feed from food waste).

**CLASS IV - the sanitary protection area with size of 100 m.**

1. Objects for washing wool.



2. Warehouses for temporary storage of wet-salted and untreated skins.
3. Production of processing of hair, bristles, down, feathers, horns and hooves.
4. Manufacture of felting and Cosmo felt.
5. Manufacture of patent leather.
6. The production of intestinal-string.

**CLASS V - sanitary protection zone of 50 m.**

1. Manufacture of leather goods.
2. Production of bristle and hair brushes.
3. Felting workshops.

**7.1.8. Industrial facilities and processing plants food and flavoring substances**

**CLASS I - sanitary protection zone 1000 m.**

1. Industrial facilities for the maintenance and slaughter of livestock.
2. Meat processing plants and meat-slaughterhouses, including bases of pre-slaughter cattle within up to three-day stock of raw materials.

**CLASS II - sanitary protection zone 500 m.**

1. Of production by rendering the fat of marine animals.
2. Production of intestinal washing.
3. Stations and cleaning and washing cars after the transportation of livestock (desipramine stations and points).
4. Production of sugar beet.
5. Production of albumin.
6. Production of dextrin, glucose and molasses.

**CLASS III - sanitary protection zone 300 m.**

1. Objects for the extraction of commercial fish.
2. Slaughterhouses of small animals and birds, as well as slaughterhouses with a capacity of 50-500 tons per day.
3. Production of beer, kvass and soft drinks.
4. Mill capacity more than 2 MT/hour, and feed mills.
5. Production-brewing trademark of malt and yeast cooking.
6. Tobacco cigarette (tobacco fermentation, tobacco and cigarette factory).
7. Production of vegetable oils.
8. Production of bottling of natural mineral waters with the release of odorous substances.
9. Fish processing plants, fish canning and fish-processing enterprises with waste products (without Smoking shops).
10. Production of sugar.
11. Meat processing, canning production.
12. Meat-, fish-Smoking production method of cold and hot Smoking.

**CLASS IV - sanitary protection zone 100 m.**

1. Elevators.
2. Production of coffee-roasting.
3. Production of oleomargarine and margarine.
4. Production of food alcohol.
5. Corn-starch, corn-treacle production.
6. Production of starch.
7. Production of primary wine.
8. Production of table vinegar.
9. Dairy and oil production.
10. Cheese-making process.
11. Mills with capacity from 0.5 to 2 t/hour.
12. Confectionery production capacity of more than 0.5 t/day.
13. Bakeries and bakery production capacity of more than 2.5 t/day.

14. Industrial plants for low-temperature storage of food products with a capacity of more than 600 tons.
15. Distilleries.

**CLASS V - sanitary protection zone 50 m.**

1. Tea-packing factories.
2. Vegetable, fruit storage.
3. Production of cognac alcohol.
4. Production of pasta.
5. Production of sausages, without Smoking.
6. Small enterprises and workshops of low capacity: meat processing up to 5 tons per day without Smoking; milk - up to 10 t/day, bread and bakery production - up to 2.5 t/day, fish - up to 10 t/day, confectionery production up to 0.5 t/day
7. The food production company's suppliers, including factories, kitchens, school-base dining facilities.
8. Industrial plants for low-temperature storage of food products with a capacity of up to 600 tons.
9. Production of grape juice.
10. Production of fruit and vegetable juices.
11. Production for processing and storage of fruits and vegetables (drying, salting, pickling and fermentation).
12. Production for finishing and bottling wines.
13. Production of soft drinks based on concentrates and essences.
14. Manufacture of mayonnaise.
15. The production of beer (no malt).

**7.1.9. Microbiological industry**

**CLASS I - sanitary protection zone 1000 m.**

1. Production of protein-vitamin concentrates from hydrocarbons (paraffins of oil, ethanol, methanol, natural gas).
2. Production, using in technology microorganisms 1-2 groups of pathogenicity.

**CLASS II - sanitary protection zone 500 m.**

1. Production of feed bacitracin.
2. Production of feed amino acids by microbiological synthesis.
3. Production of antibiotics.
4. Production of fodder yeast, furfural and alcohol from wood and agricultural waste by hydrolysis.
5. Production of enzymes for various purposes with a surface method of cultivation.
6. Production of pectins from vegetable raw materials.

**CLASS III - sanitary protection zone 300 m.**

1. Production of food yeast.
2. Production of biological products (trichograms, etc.) for the protection of agricultural plants.
3. Production of plant protection products by microbiological synthesis.
4. Research institutes, objects of microbiological profile.
5. Production of vaccines and serums.

**CLASS IV - sanitary protection zone 100 m.**

1. Production of enzymes for various purposes with a deep method of cultivation.

7.1.10. Production of electric and thermal energy during combustion mineral fuel

**CLASS I - sanitary protection zone 1000 m.**

1. Thermal power plants (TPP) with an equivalent electrical capacity of 600 mW and above, using coal and fuel oil as fuel.

**CLASS II - sanitary protection zone 500 m.**

1. Thermal power plants (TPP) with an equivalent electrical capacity of 600 mW and above, operating on gas and gas-fuel oil.

2. Thermal power plants and district boilers with a thermal capacity of 200 Gcal and above, working on coal and fuel oil.

**CLASS III - sanitary protection zone 300 m.**

1. Thermal power plants and district boilers with a thermal capacity of 200 Gcal and above, working on gas and gas-oil fuel (the latter - as a reserve), belong to the enterprises of the third hazard class with a size of 300 m.

2. The ash dumps of thermal power plants (TPP).

**7.1.11. Objects and production of agro-industrial complex and small business**

**CLASS I - sanitary protection zone 1000 m.**

1. Pig farm.
2. Poultry farms with more than 400 thousand laying hens and more than 3 million broilers a year.
3. Complexes of cattle.
4. Open storage of manure and litter.

**CLASS II - sanitary protection zone 500 m.**

1. Pig farms from 4 to 12 thousand heads.
2. The farm of cattle of from 1200 to 2000 cows and 6000 heads of young animals.
3. Farms are fur-breeding (Minks, foxes, etc.).
4. Poultry farms from 100 thousand to 400 thousand laying hens and from 1 to 3 million broilers a year.
5. Open storage of the biologically treated liquid fraction of the manure.
6. Closed manure and litter stores.
7. Warehouses for storage of toxic chemicals over 500 tons.
8. Production of processing and etching of seeds.
9. Warehouses of liquefied ammonia.

**CLASS III - sanitary protection zone 300 m.**

1. Pig farms up to 4 thousand heads.
2. Farms of cattle less than 1200 heads (all specializations), farms horse-breeding.
3. Farm sheep 5-30 thousand heads.
4. Poultry farms up to 100 thousand laying hens and up to 1 million broilers
5. Site for that has undergone pit storing manure and manure.
6. Warehouses for storage of pesticides and fertilizers more than 50 tons.
7. Treatment of agricultural lands with pesticides with the use of tractors (from the borders of the fields to the village).
8. Fur farm.
9. Garages and parks for repair, maintenance and storage of trucks and agricultural machinery.

**CLASS IV - sanitary protection zone 100 m.**

1. Greenhouses and greenhouses.
2. Warehouses for storage of mineral fertilizers, pesticides up to 50 tons.
3. Warehouses of dry mineral fertilizers and chemical plant protection products (the zone is established before the processing and storage of food products).
4. Reclamation facilities using animal waste.
5. Shops for the preparation of feed, including the use of food waste.
6. Farms with animals (pigsties, barns, nurseries, stables, animal farms) up to 100 heads.
7. The warehouses of combustive-lubricating materials.

**CLASS V - sanitary protection zone 50 m.**

1. Storage of fruits, vegetables, potatoes, grain.
2. Material warehouse.
3. Farms with animals (piggeries, barns, kennels, stables, fur farms) and 50 cows.

**7.1.12. Sanitary facilities, transport infrastructure, facilities utilities, sports, trade and services****CLASS I - sanitary protection zone 1000 m.**

1. Landfills for the placement, disposal, disposal of toxic waste production and consumption of 1-2 hazard classes.
2. Sewage and odor fields.
3. Burial sites with burial in the pits.
4. Recycling plants for the elimination of animal corpses and confiscated.
6. Crematoria, with the number of furnaces more than one.
7. Incineration, waste sorting and waste processing facilities with a capacity of 40 thousand tons/year.

**CLASS II - sanitary protection zone 500 m.**

1. Incineration, waste sorting and waste processing facilities with a capacity of up to 40 thousand tons/year.
  2. Landfills of municipal solid waste, composting areas of municipal solid waste.
  3. Burial sites with biological cells.
  4. Drain stations.
  5. Cemeteries of the mixed and traditional burial from 20 to 40 hectares.
- Note: the Location of the cemetery by the size of the territory more than 40 hectares is not permitted.
6. Crematoria without preparatory and ritual processes with one single-chamber furnace.
  7. Customs terminals, wholesale markets.
  8. Landfills for the placement, disposal, disposal of toxic waste production and consumption of 3-4 hazard classes.

**CLASS III - sanitary protection zone 300 m.**

1. Central base for the collection of scrap materials.
2. Cemeteries of the mixed and traditional burial from 10 to 20 hectares.
3. Sites for greenhouse and greenhouse farms using waste.
4. Composting of waste without manure and feces.
5. Objects in the service of trucks.
6. Bus and trolleybus stations.
7. Bus and trolleybus parks (with repair facilities).
8. Open-type sports and recreation facilities with stationary stands with a capacity of more than 500 seats.

**CLASS IV - sanitary protection zone 100 m.**

1. Bases of regional purpose for collection of waste materials.
2. Objects for maintenance of cars, trucks with the number of posts no more than 10, taxi fleet.
3. Motorized vehicle parks cleaning (CMU) without repair facilities.
4. Parking (parks) of long-distance trucks .
5. Gas stations for refueling vehicles with liquid and gas motor fuel.
6. Washing of trucks of portal type (located within the boundaries of industrial and communal storage areas, on highways at the entrance to the city, on the territory of motor transport enterprises).
7. Dry cleaning.
8. Laundromats.
9. Bath and Laundry plants.
10. Open-type sports and recreation facilities with stationary stands with a capacity of up to 500 seats.
11. Bus and trolleybus parks up to 300 cars.
12. A veterinary facility with the keeping of animals, vivaria, kennels, dog training centers keeping animals.
13. Garbage loading stations.

14. Jail, receivers, distributors.
15. Cemetery of mixed and traditional burial area of 10 hectares or less.
16. Car wash with the number of posts from 2 to 5.
17. Cryogenic filling stations intended only for filling vehicles with liquefied natural gas and/or compressed natural gas obtained by regasification in the territory of the liquefied natural gas station, with a storage volume of liquefied natural gas from 50 to 100 m .

**CLASS V - sanitary protection zone 50 m.**

1. Warehouses for storage of food products (meat, dairy, confectionery, vegetables, fruits, beverages, etc.), medicinal, industrial and household goods.
2. U-turns venues by public transport.
3. Closed cemeteries and memorial complexes, cemeteries with burial after cremation, columbaries, rural cemeteries.
4. Open-type sports and recreation facilities with sports games with stationary stands with a capacity of up to 100 seats.
5. Passenger car service stations up to 5 posts (without painting and tin works).
6. Stand-alone hypermarkets, supermarkets, shopping malls and centers, catering, small wholesale markets, food and industrial markets, multifunctional complexes
7. Dovecotes.
8. Petrol stations intended only for refueling passenger vehicles with liquid motor fuel, with the presence of no more than 3 fuel dispensers, including facilities for drivers and passengers (shop related products, cafes and sanitary facilities).
9. Car wash up to two posts.
10. Dry cleaning capacity of not more than 160 kg/shift.
11. Automobile gas-filling compressor stations with compressors indoors or inside containers with quantity of gas stations no more than 500 cars/day, including with objects of service of drivers and passengers (shop of the accompanying goods, cafe and sanitary knots).
12. Cryogenic gas stations intended only for filling vehicles with liquefied natural gas and/or compressed natural gas obtained by regasification in the territory of the liquefied natural gas station, with a storage volume of liquefied natural gas not exceeding 50 m , including facilities for drivers and passengers (shop of related goods, cafes and sanitary units).
13. Filling station is only intended for fueling vehicles with liquefied hydrocarbon gas, including service facilities for drivers and passengers (shop merchandise, dining and sanitary facilities)

Vladimir Pinaev

Tatyana Ledashcheva

Environmental support of projects in Russia – modern practices  
2<sup>nd</sup> edition

Монография издана в авторской редакции

Сетевое издание

Главный редактор – Кирсанов К.А.

Ответственный за выпуск – Алимова Н.К.

Научное издание

**Системные требования:**

операционная система Windows XP или новее, macOS 10.12 или новее, Linux.  
Программное обеспечение для чтения файлов PDF.

Объем данных 3 Мб

Принято к публикации «21» июля 2022 года

Режим доступа: <https://izd-mn.com/PDF/41MNNPM22.pdf>, свободный. – Загл. с экрана. –  
Яз. рус., англ.

ООО «Издательство «Мир науки»

«Publishing company «World of science», LLC

Адрес:

Юридический адрес — 127055, г. Москва, пер. Порядковый, д. 21, офис 401.

Почтовый адрес — 127055, г. Москва, пер. Порядковый, д. 21, офис 401.

<https://izd-mn.com>

**ДАННОЕ ИЗДАНИЕ ПРЕДНАЗНАЧЕНО ИСКЛЮЧИТЕЛЬНО ДЛЯ ПУБЛИКАЦИИ НА  
ЭЛЕКТРОННЫХ НОСИТЕЛЯХ**