



**SAKHALIN-1 PROJECT
REPORT ON ENVIRONMENTAL PROTECTION ACTIVITIES**

EXXON NEFTEGAS LIMITED

2017

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Attachment: ENL’s SSHE performance in 2014-2017.

1. HEALTH, SAFETY, AND ENVIRONMENTAL PROTECTION IN 2017.

In 2017 Exxon Neftegas Limited conducted the following major activities to develop a culture of safety, health, and environmental protection:

- ◆ Promotion of safety culture principles adopted by Exxon Mobil Corporation at ENL and among contractors;
- ◆ The 14th annual SSHE Forum for contractors in Yuzhno-Sakhalinsk with participants representing more than 30 companies;
- ◆ Continued implementation of contractors' safety improvement process through best practices for contractor interface management;
- ◆ Assessment of the Operations Integrity Management System;
- ◆ Emergency response exercises at Company sites;
- ◆ Familiarization presentation to ENL and contractors' personnel on monitoring birds in Piltun Bay and Wrangel island, held on Odoptu sites.

During 2017 at Exxon Neftegas Limited facilities, accidents or incidents, including oil and oil products spills affecting the population or the environment, were not recorded.

2. 2017 ENVIRONMENTAL PERFORMANCE

Exxon Neftegas Limited pays special attention to environmental protection activities and monitors numerous environmental performance indicators and parameters on a daily, monthly, quarterly, and annual basis. This section presents the summary of environmental performance at Sakhalin-1.

2.1 Waste management

The data presented herein are in compliance with State Statistic Report form 2-TP (wastes) by Exxon Neftegas Limited, for 2017.

Diligent management of waste management system is considered by ENL as one of priority tasks in the frame of Sakhalin-1 project operation.

The waste management system is based on uniform standards and requirements for all Sakhalin-1 facilities, strategic planning, and centralized waste management, infrastructure and work methods improvements, analysis of key parameters activities as compared to best practical results in the sector at implementation of required remediation activities.

To achieve this purpose, ENL implements a waste management strategy based on Exxon Mobil waste management standards, and the RF Law requirements, including the following principles arranged in the applicability sequence:

- ◆ Minimizing waste generation
- ◆ Waste recycling and reuse
- ◆ Application of 'best available' technologies in the field of waste neutralization and disposal
- ◆ Waste disposal in special landfills

ENL's waste management strategy is uploaded to: www.sakhalin-1.ru

2.1.1. Realization of Waste Management Strategy in 2017.

Minimization of waste generation.

Waste minimization is the most important part of the Sakhalin-1 project waste management strategy due to the remote location of production facilities.

In the framework of prevention and reduction of waste generation volumes, ENL company annually realizes a number of initiatives and activities aimed at the use of low-waste and resource-saving technologies, and at prevention of waste generation.

Specifically, in 2017 replacement of lighting sources for energy-saving and LED luminaries continued, recycling water system at De-Kastri crude oil export terminal (OET) was used, initiatives aimed at reducing office paper and disposable tableware consumption were implemented. Specifically, some document flow procedures were made electronic. In addition, the company utilizes the surplus equipment and material sales system aimed at cost optimization and waste reduction.

Recycling and reuse of waste.

Main attention at waste collection, sorting, and recycling is focused on revealing of waste generation sources and separate collection of a waste which can be reused in the main manufacturing process or recycled as secondary raw materials. The company continuously extends the list of the organizations involved in recycling and reuse of waste.

In 2017, three new Sakhalin and the Far East enterprises became ENL subcontractors for recycling of mercury lamps, office equipment and food waste. In addition to tires, the company has started handing over for recycling and reuse other rubber waste and rubber products, which have lost their consumer properties. By introducing an additional collection system at coastal industrial facilities in 2017, the volume of office paper waste transferred for recycling doubled.

Application of 'best available' technologies in the field of waste neutralization and disposal.

ENL is using the following BATs in the field of its waste management:

- ITS 9-2015 "Waste Neutralization by Thermal Methods (Waste Incineration)",
- ITS 17-2016 "Disposal of production and consumption waste".

As part of the incinerators renewal initiative, ENL has obtained three new incinerators for 3-5 hazard class waste neutralization, to be installed in 2018 and 2019. The incinerators are also among the best available technologies in the field of waste neutralization.

Waste disposal on special landfills

ENL's primary goals in the field of waste disposal are the effective use of available waste landfilling areas for waste disposal and the use of ecologically acceptable methods of waste disposal in order to minimize environment impact effects.

- ◆ ENL deposits its industrial and household waste in the Sakhalin Region at the Nogliky landfill and in Khabarovsk Krai at its own landfill in the area of De-Kastri OET. All landfills used for waste deposition for the "Sakhalin-1" project are registered in the State register of waste disposal facilities.
- ◆ ENL is pumping drilling waste and produced water into isolated formations of licensed subsoil areas. This method is generally recognized as the most ecologically safe for drilling and oil extracting waste management.
- ◆ In 2017, ENL completed an inventory of waste collection/disposal sites at all facilities operated within "Sakhalin-1" project. The updated information about such facilities is included in the State register of waste disposal facilities.
- ◆ According to requirements of the Russian laws and regulations, ENL monitors environmental conditions at waste disposal facilities of the "Sakhalin-1" project and, within their impact range.

According to approved programs, monitoring is carried out at the De-Kastri landfill, at waste disposal sites on Orlan Offshore Platform (OP) and Berkut Offshore Stationary Platform (OSP), Chayvo Oil Processing Facility (OPF), Odoptu-2 Well Site – Northern (Odoptu NWS), Olympia residential complex, and De-Kastri OET, around the area of Chayvo Well Site (WS) and Odoptu NWS drilling pits, and also at Arkutun-Dagi subsoil block, at Chayvo offshore and Chayvo onshore subsoil blocks, Garomay licensed subsoil block and at "Odoptu-1" subsoil block.

Monitoring includes soil conditions at waste disposal and storage areas, groundwater and stormwater quality. Characteristics of injected drilling waste and production water, as well as technical parameters of injection processes are monitored in accordance with requirements of authorized mineral resources management agencies.

The results of monitoring at waste disposal sites in 2017 showed that in general controlled parameters met the required environmental quality standards.

Main indicators in the field of waste management in 2017

On facilities constructed and operated under the "Sakhalin-1" project in the Sakhalin Region and Khabarovsk Krai in 2017 2,622,005.8 tonnes of produced water, and of drilling, industrial and household waste were generated.

Total amount of generated waste included:

- ◆ Produced water – 2,378,768.0 tonnes;
- ◆ Drilling waste (pulp, drill cuttings) –198,715.7 tonnes;
- ◆ Sanitary wastewater from the Orlan OP – 23,933.4 tonnes;
- ◆ Sanitary wastewater from De-Kastri OET – 11,396.0 tonnes.

All sanitary wastewater from De-Kastri OET was transferred for neutralization to "Prometei" LLC.

Produced water, drilling waste and wastewater from the Orlan offshore platform were injected through a specialized well into deep formations of the license subsoil blocks:

- ◆ Chayvo onshore license block;
- ◆ Chayvo offshore license block;
- ◆ A block within Arkutun-Dagi field;

◆ Onshore Odoptu-1 license.

Part of drilling waste (drill cuttings) in the amount of 4.9 tonnes was handed over for recycling to the licensed enterprise "Terra-Torf". LLC».

Produced water, drilling waste and wastewater produced at the Orlan OP and De-Kastri OET amount to 99.6% of the total amount of waste generated in 2017.

Further on, the combined amount of these two types of waste is excluded from review in order to keep the data representative.

Industrial and household waste generated by ENL in 2017 amounted to 9 192.7 tons.

In 2017, 99.9% or 9,219.0 tonnes of the Hazard Class 1-5 waste generated and accumulated since 2016 were neutralized, recycled and buried including:

Transferred for recycling and reuse

In 2017, the level of recycling and reuse of industrial and household waste generated at the Company facilities has reached 63.7%. This result has been achieved due to a high manufacturing culture, early and full waste segregation, and also due to professional waste management organization, excluding a possibility of disposal and/or secondary pollution of potentially processed waste

At ENL production facilities, oily wastewater is sent to separators to extract oil and return it to the production process and to treat the wastewater in compliance with the laws of the Russian Federation. The company uses highly efficient technologies and equipment for treatment of oily industrial wastewater, water used for washing and testing production equipment, and storm water that may be contaminated with oil and oil products.

The waste transferred to outside contractors for recycling and reuse includes: various batteries, waste oils and lubricants, tires, LED bulbs, stabilized sludge from biological treatment plants, plastic and polyethylene waste, cardboard, paper, ferrous and non-ferrous scrap metal, printer cartridges, machinery, ash, construction waste, food waste, plant waste from landscaping activities (care of lawns and flower beds) on the grounds of industrial facilities and company offices.

Neutralized

28.5% of the waste was processed by thermal treatment in the company's own incinerators.

The percent increase of thermally neutralized waste in 2017 in comparison with the previous period is connected with generation of significant quantities of oil sludge during execution of the planned crude oil tank cleaning at De-Kastri OET. Generated oil sludge was completely neutralized by the specialized enterprise "Ecoil" (Komsomolsk-on-Amur).

Neutralized by contractors and subcontractors' specialized equipment 0.02 % of mercury-containing waste.

Buried

- ◆ 2.0% of Hazard Class 4 and 5 waste were sent to a specialized solid domestic waste landfill of Chisty Gorod LLC in Nakhodka for disposal. The landfill has been booked in a state register SRWDF as a waste disposal facility under No 25-00049-3-00692-311014.
- ◆ 4.5% of hazard classes 4 and 5 waste were disposed at the specialized solid waste landfill of the Waste Management Agency JSC in Nogliki settlement. The landfill is

registered in the SRWDF state register of waste disposal sites under the number 65-00049-3-00705-021116

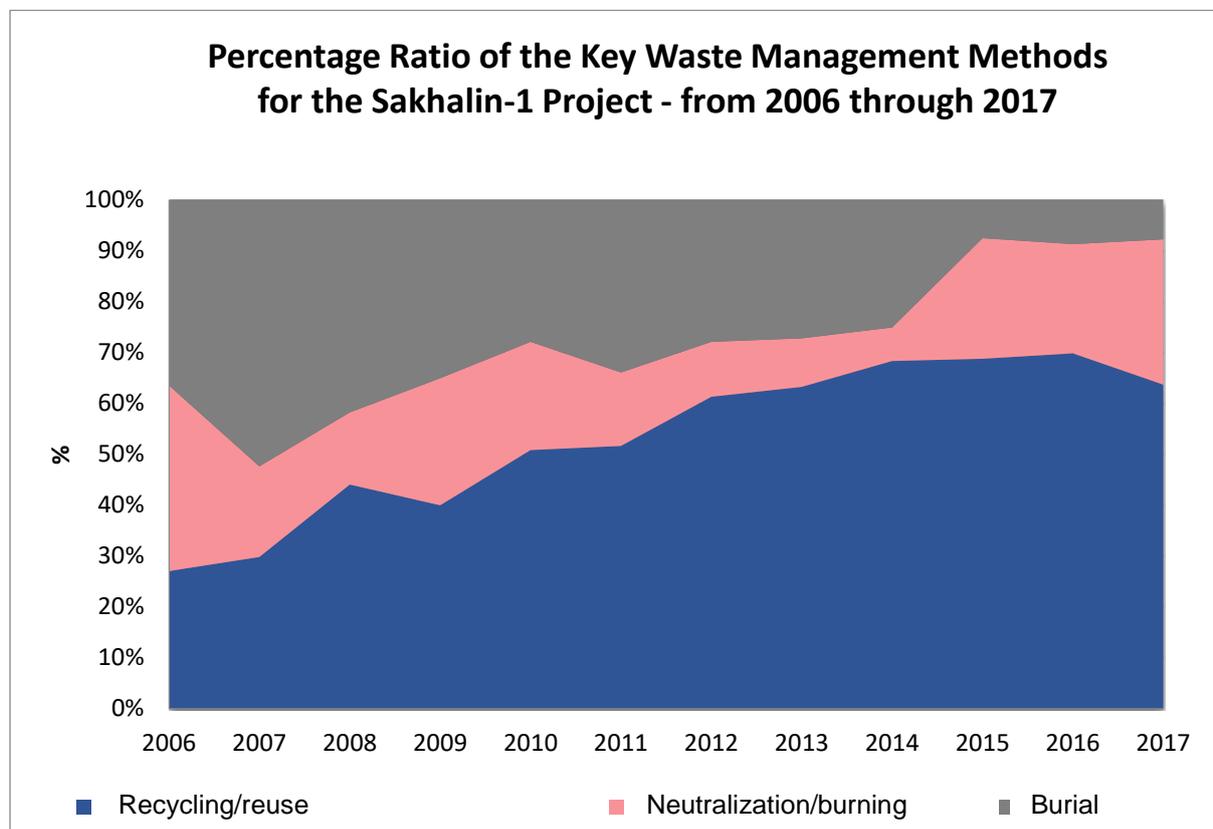
- ◆ 0.7% of industrial and household waste of 4-5 hazard classes were disposed at the ENL own landfill in the De-Kastri settlement. The landfill is registered in the SRWDF state register of waste disposal sites under the number 27-00005-3-00592-250914.
- ◆ 0.5% of other process waste were injected into waste disposal areas of the licensed subsoil formations. Waste disposal facilities are recorded in the SRWDF under numbers: 65-00026-3-00592-250914; 65-00024-3-00592-250914; 65-00048-3-00168-070416; 65-00032-3-00592-250914

Summary Data on ENL Industrial and Domestic Waste Management in 2017 .

Waste management	%
Recycling and reuse	63,7%
Neutralization (incineration)	28,5%
Burial	7,7%
Total	99,9%

Prior to transportation to waste recycling facilities the remaining 0,1% of wastes were located at the specially equipped waste storage facilities of Sakhalin-1 project for accumulation of the lot required for transportation.

The diagram shows the percentage data of main industrial and household waste management methods for the whole "Sakhalin-1" project from 2006 till 2017 inclusive.



2.2 Water use, water consumption, and water disposal

The data presented herein are in compliance with State Statistical Report form 2-TP (water management) by Exxon Neftegas Limited, for 2017.

ENL carries out discharge of clean or treated in accordance with normative requirements waters into surface water bodies. The most effective available wastewater disposal technology is injection into a disposal well. The industrial wastewaters, rainwaters and household wastewater from Sakhalin-1 Project facilities are injected into specialized wells or sent to treatment facilities and to leach fields or into surface water bodies upon treatment. Uncontaminated wastewater (cooling water and water from desalination systems) is discharged into the sea.

In 2017, during facilities construction and operation under the "Sakhalin-1" project ENL carried out its water economic activities on the basis of seven decisions and thirteen agreements on the right of using surface water bodies, and also on the basis of five licenses for the right of using subsoil resources for extraction of underground waters

Total water consumption volume amounted to 16,952.85 thousand m³. Total wastewater disposal volume was 16,568.33 thousand m³.

Orlan Offshore Platform

During the reporting year, water usage at the Orlan platform was carried out on the basis of two Water Use Agreements and two Water Use decisions.

Intake of sea water in 2017 was 5,785.30 thousand m³. The specified sea water intake limit is 10,908.24 thousand m³/year

Wastewater disposal:

- nominally clean wastewater from the equipment cooling system and the fire pumps testing system were disposed to the sea in the amount of 5,678.63 thousand m³;
- nominally clean wastewater from the desalination system were disposed to the sea in the amount of 93.66 thousand m³;
- household wastewater, which have passed electrochemical dissociation in «Omnipure 15 MX» system, and wastewater containing drilling technological waste, flushing waters from industrial zones, and also rainwater/stormwater drains were injected through disposal well in the Chayvo offshore license area.

Total amount of all wastewater injected in 2017 amounted to 23.93 thousand m³.

Chayvo Onshore Processing Facility (Chayvo OPF) and Chayvo Well Site (Chayvo WS)

Water consumption at OPF Chayvo and Chayvo WS amounted to 80.3 thousand m³. The water was sourced from the ground source in accordance with the subsoil use license.

Wastewater disposal:

- household wastewaters, after treatment at biological wastewater treatment facilities of drilling platforms and Chayvo OPF were directed to leach fields in the volume of 50,2 thousand m³;
- industrial wastewaters via the regular surface drainage system were supplied to the retention pond of Chayvo OPF industrial zone, and then injected through WI-n disposal wells in the Garomay license area for placing produced waters and other technological waste.

De-Kastri Oil Export Terminal, Main Oil Pipeline and Single-Point Mooring (SPM) located in the Ulchi District of Khabarovsk Krai

Intake of fresh water was taken from underground sources on the basis of the subsurface use license, and amounted to 14.9 thousand m³.

Wastewater disposal: sanitary wastewater in the volume of 11.4 thousand m³ and filter flushing wastewater in the volume of 0.38 thousand m³ after treatment at biological treatment facilities was transported to De-Kastri settlement Waste Water Treatment Plant.

Leachate from the industrial and household waste landfill, represented by atmospheric precipitation which has passed through the waste layer was transported from the landfill to the wastewater treatment facilities of the terminal.

Surface drains from the terminal site was collected in the system of retention ponds and, treated wastewater in the amount of 114.74 thousand m³ then was discharged to the sea in accordance with permit conditions/

Odoptu 2 Well Site (Northern) (Odoptu NWS).

Water supply of Odoptu NWS facilities, including the multi-purpose building and the drillers' temporary camp, was sourced from «Odoptu-4» water intake owned by EON LLC.

Water consumption was 124.18 thousand m³

Household wastewater after treatment, was disposed to leach fields in the volume of 122.5 thousand m³.

Berkut Fixed Offshore Platform

The Berkut platform is located on the northeast shelf of Sakhalin island, in the aquatic area of the Okhotsk sea in the exclusive economic zone of the Russian Federation.

According to the clarification of the RF Federal Water Resources Agency dated 20.09.2011 № BH-02-28/4462, the norms of the RF Water Code at making the water-use agreement and the decision on water body submission for use do not cover on aquatic areas of water bodies located in the exclusive economic zone of the Russian Federation.

Intake of sea water in 2017 was 10,834.4 thousand m³.

Wastewater disposal to sea:

- mixed wastewaters (process, household, cooling) discharge from the platform amounted to 10,476.4 thousand m³:

In 2017 ENL conducted a comprehensive analysis of waste disposal facilities efficiency with the specialized company experts involvement. As a result of this audit, a number of recommendations were received to improve the efficiency of wastewater treatment, which are now being introduced into the production process.

2.3 Air emissions

The data presented herein are in compliance with State Statistical Report form 2-TP (air) by Exxon Neftegas Limited, for 2017.

Flared gas

In general, the flaring level for the Sakhalin-1 Project in 2017 was 2.5%.

Air emissions

In 2017, actual emissions of all substances and total emissions as a whole at all platforms of the company did not exceed permitted concentration emissions.

Sakhalin-1 operations sites	Permitted emission t/year	Actual emission t/year
Nogliki district	193 713.1	28 209.3
Okha district	63 587.2	16 888.7
Khabarovsk krai	7 120.4	2 964.8
Aniva district	17. 5	2.8
Yuzhno-Sakhalinsk	5.3	1.4

Berkut fixed offshore platform topside installation activities were conducted in Nogliki district in 2016. The equipment being the main source of emissions was at the startup and commissioning stage. In 2017, primary and support equipment of the Berkut platform was put in operation.

The Berkut platform was specially designed for harsh subarctic conditions and is the largest offshore field development facility in Russia. New well drilling, testing and commissioning activities were carried out at the platform in 2017, along with processes associated with oil production and transportation.

In 2017, scheduled construction, startup and commissioning activities were conducted at ENL production facilities in Nogliki (Chayvo field) and Okha (Odoptu field) districts. Concurrently with the operation of Odoptu NWS, wellsite expansion activities were conducted at Odoptu 2 (North) Well Site in Okha district, including integrated testing of gas systems.

In 2017, equipment inventory was made and draft Maximum Permissible Emission (MPE) Standards for harmful substances were developed and approved, and new emission permits were issued for the following facilities:

- Odoptu Field. North Well Site. Permit No. 06-024/2017-V, issued on March 2, 2017 by Sakhalin Oblast Administration of Rosprirodnadzor;
- De-Kastri Oil Export Terminal. Permit No. 129/17, issued on October 13, 2017 by Rosprirodnadzor Department for Far Eastern Federal District;
- Orlan Fixed Offshore Platform. Permit No. 13-103/2017-V, issued on December 15, 2017 by Sakhalin Oblast Administration of Rosprirodnadzor;
- Block Valve Stations 10, 11 and 12 of the Chayvo Onshore Processing Facility (OPF) – De-Kastri Oil Export Terminal Flowline. Permit No. 135/17, issued on October 30, 2017 by Rosprirodnadzor Department for Far Eastern Federal District.

Total authorized air pollutant emissions for Exxon Neftegas Limited (in accordance with permits issued for construction and operation periods) in 2016 amounted to 62,704.7 t/year and, in 2017 - 264 443.8 t/year.

In 2016, actual air emissions were 25.7% of the authorized volume and in 2017 – 18.2 % of the authorized emission levels. Improvement of the indicator in 2017 was due to the efforts by ENL in equipment setting up and maintenance, coupled with timely inventory taking campaign and consultations with equipment suppliers about effective and safe operation of that equipment.

2.4. Oil/Products Spills Prevention

Oil/Products Spills

In 2017, 38 minor petroleum product spills as a result of construction and production activities were recorded at ENL facilities, of which 36 occurred at production sites in Sakhalin Oblast, and 2 occurred in Khabarovsk Krai.

The total volume of spilled oil and petroleum products was 1756,18 liters. All these spills occurred within boundaries of the company's industrial sites and were immediately and fully cleaned up.

The main reasons for such spills/leaks of petroleum products such as hydraulic fluids, lubricating oils, diesel fuel are the results of the occasional failure of some parts of mechanical equipment and motor vehicles used in production activities at the Sakhalin-1 Project sites. ENL specialists working at the facilities took the necessary actions in each specific case to respond to the incidents in a timely manner. The consequences of the leakage were eliminated immediately.

The Orlan and Berkut fixed offshore platforms for the Sakhalin-1 Project are equipped with an internal drain system operating in a closed loop. In the event of leakage of oil or oil products on any of the platform decks, all liquids are confined in the drain system, which keeps them out of the environment.

ENL has been developing and implementing procedures aimed at strengthening in-process monitoring, in particular:

- introduction of a system for testing equipment prior to and after the completion of work for wear and tear on hydraulic equipment and machinery;
- establishment of requirements for the mandatory availability of leakproof drip trays to be placed under heavy equipment in parking spaces;
- stricter requirements for the motor vehicles of the contractors and subcontractors that provide services for the delivery of materials and equipment to the Sakhalin-1 Project sites.

ENL continues to work with the contractors and subcontractors the provide services for Sakhalin-1 Project facilities. The contractors and subcontractors are sent regular notifications requiring them to take all the measures required to prevent spills and leaks of oil and oil products during production activities. ENL considers the prevention of spills and leaks of oil and oil products not only a priority but also a necessary work standard.

In each case of oil product leaks, a written report was prepared, and an investigation and analysis of the causes was conducted.

Sakhalin-1 Corporate oil spill response plan

The ENL Corporate OSR Plan covers all spills of oil products that may occur at Sakhalin-1 Project oil production and export facilities located on the offshore shelf of Sakhalin Island, on Sakhalin Island, and in Tatar Strait, as well as in the continental area of Khabarovsk Krai, including:

- ◆ the waters of the Sea of Okhotsk;
- ◆ coastal areas, including Piltun Bay and Chayvo Bay on the northeast coast of Sakhalin Island;
- ◆ land areas along the route of the main pipeline and flowlines in the northern part of Sakhalin Island;
- ◆ the Tatar Strait and Nevelskoy Strait, including the west coast of Sakhalin Island. and coastal areas of Khabarovsk Krai.

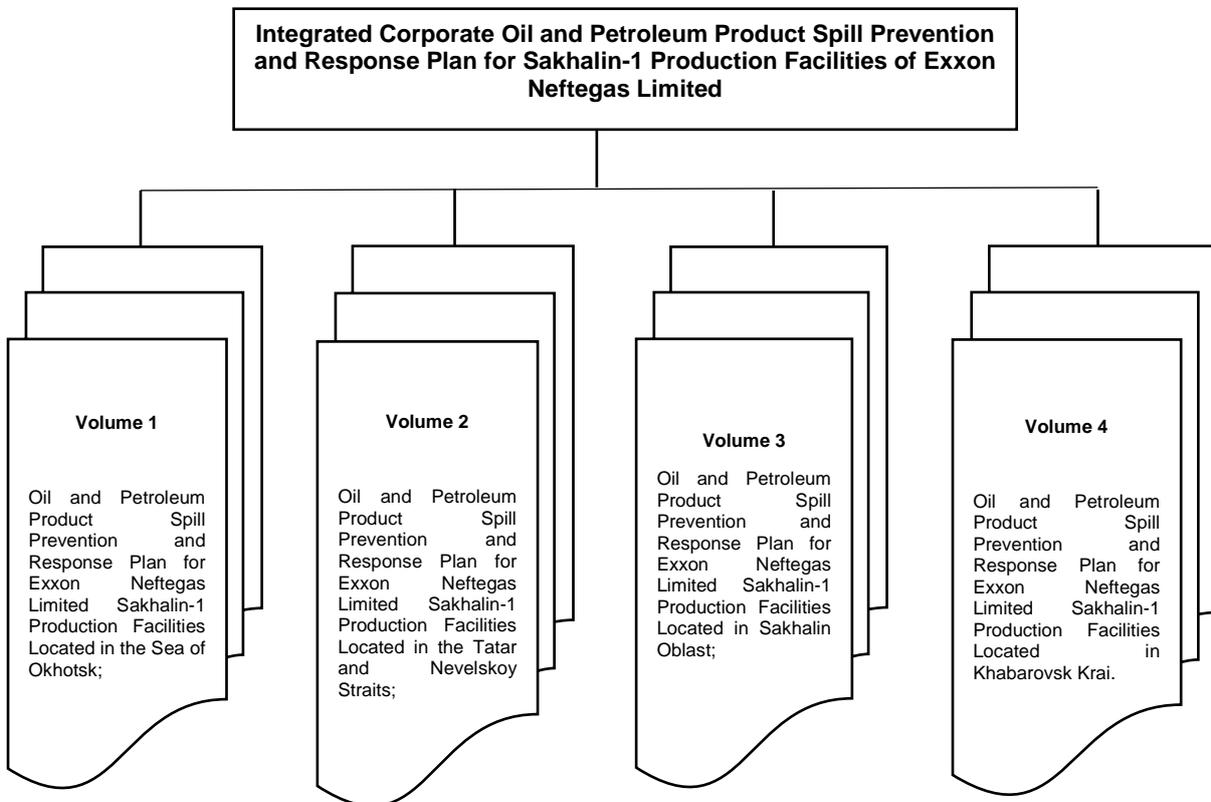
The purpose of the Oil Spill Response Plan is to target actions for oil spill and oil product spill prevention and response. Such planning is intended to ensure timely and effective measures to mitigate the consequences of spills, to maintain emergency response manpower and resources in a state of constant readiness, to ensure the safety and protection of human beings and the environment, and to minimize potential damage to the environment and production facilities and losses in the event of oil or oil products spills.

The plan includes methods, rules, recommendations, and supporting information to allow ENL to:

- ◆ initiate timely and effective response to oil and oil product spills in compliance with the laws of the Russian Federation using manpower and resources of the company, contractors, and government organizations;
- ◆ develop procedures for initial emergency response in the event of the most likely scenarios of a Tier 1 oil or oil product spill;
- ◆ together with the Ministry of Emergencies of the Russian Federation (RF MChS), organize and coordinate general response to Tier 2 and 3 oil and oil product spills.

The process of development of the “Integrated Corporate Oil and Petroleum Product Spill Prevention and Response Plan for Sakhalin-1 Production Facilities of Exxon Neftegas Limited” (hereinafter, Integrated Corporate OSR Plan) was completed in 2016 in accordance with the requirements of current legislation in the field of oil spill emergency prevention and response

The structure of the Integrated Corporate Oil and Petroleum Product Spill Prevention and Response Plan is presented below:



OSR plans for production facilities located on the continental shelf of the Russian Federation and in inland sea waters, territorial waters, and the contiguous zone of the Russian Federation were developed in compliance with the laws of the Russian Federation:

- Government Resolution No. 1189 of November 14, 2014, "On the Organization of Oil Spill Prevention and Response on the Continental Shelf of the Russian Federation and in Inland Sea Waters, Territorial Waters, and the Contiguous Zone of the Russian Federation";
- Federal Law No. 174-FZ of November 23, 1995, *On Environmental Expert Reviews* for the OSR plans of production facilities on the continental shelf of the Russian Federation and in territorial waters and inland seas;
- Order of the State Committee for Environmental Protection No. 372 of May 16, 2000.

The Integrated Corporate Oil and Petroleum Product Spill Prevention and Response Plan for Sakhalin-1 Production Facilities of Exxon Neftegas Limited under the Sakhalin-1 Project received a positive State Environmental Expert Review (SEER) finding approved by Order No. 474 of the Federal Service for Supervision of the Management of Natural Resources Directorate for the Far East Federal District on August 10, 2016.

The OSR plan was approved on the basis of the positive SEER finding and in accordance with the requirements of Federal Law No. 155-FZ of July 31, 1998, *On the Inland Seas, Territorial Waters, and Contiguous Zone of the Russian Federation*, and Federal Law No. 187-FZ of November, 30 1995, *On the Continental Shelf of the Russian Federation*.

The content and components of OSR plans for offshore facilities comply with the requirements specified in Government Resolution No. 1189 of November 14, 2014.

General Procedure for Endorsement and Approval of OSR plans for Sakhalin-1 Project Facilities in Offshore Waters



Development and approval of the OSR plans for production facilities in the Russian Federation were accomplished in compliance with the following:

- Government Resolution No. 240 of April 15, 2002, "On the Procedure for the Organization of Oil and Petroleum Products Spill Prevention and Response in the Russian Federation";
- Government Resolution No. 613 of August 21, 2004, "On Urgent Measures for Oil and Petroleum Products Spill Prevention and Response";
- Order of the Ministry of Emergencies No. 621 of December 28, 2004, "On Approval of the Procedure for the Development and Approval of Plans for Oil and Petroleum Products Spill Prevention and Response in the Russian Federation."

OSR Plans for production facilities in the Russian Federation were endorsed by the RF MChS Central Directorates for Sakhalin Oblast and Khabarovsk Krai, the Rf MChS Far East Regional Center, the territorial departments of Rostekhnadzor, and executive bodies of Sakhalin Oblast

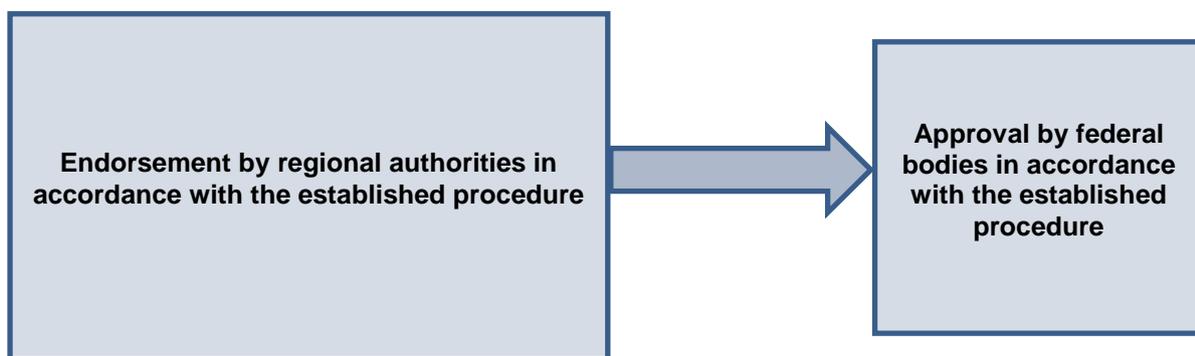
and Khabarovsk Krai and approved by the Russian Federation Ministry of Energy the Russian Federation Ministry of Emergencies.

The Integrated Corporate Oil and Petroleum Product Spill Prevention and Response Plan for Sakhalin-1 Production Facilities of Exxon Neftegas Limited was endorsed and approved by three federal and seven regional executive bodies of the Russian Federation.

The OSR Plan was enacted by ENL Order No. 767 of March 30, 2017.

The content and components of OSR plans for production facilities in the Russian Federation comply with the requirements specified in RF MChS Order No. 621 of December 28, 2004.

General Procedure for Endorsement and Approval of OSR Plans for Sakhalin-1 Project Facilities in Sakhalin Oblast and Khabarovsk Krai



2.5 Purchases of emergencies response equipment (OSR, fire protection and rescue equipment) in 2017

In 2017, ENL purchased the following OSR equipment:

- Marine oil-spill booms on container-type hydraulic coil Lamor HDB 1500 – 250 meters;
- Container-type hydraulic coil for transportation of marine oil-spill booms Lamor HDB 2000 – 1 pc;
- Motor boat «Volzhanka» 65 for 4 persons with suspendible Yamaha motor 150 l/s – 1 pc;
- Cross-country vehicle "Agro" DHI 750EU on wheel-caterpillar drive – 1 pc;
- Consumable materials (sorption pads, sorption booms);
- Fire equipment (foam mixer, fire hoses, fire extinguishers, fire trailer "Natisk");
- Field equipment for organization of response personnel of housekeeping (tables, benches and tents).

ENL acquires OSR equipment from the world's largest equipment developers, such as Vikoma International Ltd., Lamor, and Desmi, which is characterized by its reliability and the possibility of using it under the climate conditions typical of northeastern Sakhalin Island.

2.6 Expenditures for Environmental Activities

Each Sakhalin-1 Project facility includes numerous environmental protection measures and equipment as part of the design solutions and implementation activities. Design solutions include the use of the latest environmental protection equipment and most environmentally friendly technologies. The table below shows ENL expenditures on environment protection in 2017.

Environment protection programs cost in 2017.

Category	Environmental CAPEX (k RUR.)	OPEX (k RUR.)
Regulatory/environmental technical personnel	136 183	142 559
Reclamation	0	113 742
Water bodies protection	1 069 292	13 560
Air protection	0	584 368
Waste management	163 643	325 286
Gray whale surveys	18 458	90 119
Monitoring birds populations registered in the RF Red Book	3 807	11 890
Environmental and in-process compliance monitoring	5 886	154 647
Environmental Engineering Surveys	56 564	0
Oil spill response activities	270 943	408 686
TOTAL	1 724 776	1 844 857
	3 569 633	

2.7 Natural Resource Use Charges

The Russian Federation Law and the Sakhalin-1 Production Sharing Agreement provide for charges for land, forest, and water use related to project facilities. The 2017 payments in this category are listed in the table below. There were no overruns for the negative impact on the environment.

Natural Resource Use Charges in 2017	k RUR
Land use (leases)	33 947.50
Subsoil use fees	0,00
Tax on extraction of common mineral resources	0,00
Water tax	43.03
Water use fees	134.26

Natural Resource Use Charges in 2017	k RUR
Total	34 124.79

3. KEY ENVIRONMENTAL PROTECTION AND ENVIRONMENTAL MONITORING PROGRAMS

3.1 Pipeline ROW Repair and Maintenance in 2017

ENL Company does not have pipelines that operate beyond the service life. The permit for commissioning of pipelines was issued in May, 2007. In 2017, maintenance and repair activities were carried out on the following “Sakhalin-1” Project pipelines: Odoptu-2 WS (Northern) – Chayvo OPF flowline, Chayvo OPF - Botasino gas line, Trunk oil pipeline Chayvo OPF – De-Kastri OET, Orlan platform – Chayvo OPF flowline, Chayvo OPF – Berkut platform produced water injection flowline, Chayvo OPF - Orlan platform gas re-injection line. These operations involved:

- ◆ Eliminating soil erosion sites and constructing engineered protective structures;
- ◆ Re-establishing the natural vegetation;
- ◆ Cutting trees and shrubs;
- ◆ Restoring the shoreline, eliminating subsidence or scouring, building protection structures from water and wind erosion;
- ◆ Restoring and increasing the backfill layer over the pipelines;
- ◆ Repairing and restoring signs (air navigation, information, road signs) within the pipeline right-of-ways.

Regular visual inspections and aerial monitoring were conducted throughout the year in both island and mainland areas to assess the technical condition of the route corridor, assess the effectiveness of engineering protection facilities, and identify any environmental concerns in a timely manner.

3.2. Environmental and In-Process Monitoring in 2017.

The environmental and in-process monitoring implemented in 2017 at ENL construction and operating sites included the types of operations listed below:

Monitoring of stationary air emission sources at:

- ◆ Chayvo Onshore Processing Facility (OPF)
- ◆ Chayvo (Chayvo WS) well site;
- ◆ De-Kastri Oil Export Terminal (OET);
- ◆ Orlan Offshore Platform (Orlan OP);
- ◆ Berkut Fixed Offshore Platform (Berkut OP);
- ◆ Odoptu Wellsite 2 (North) (Odoptu NWS);
- ◆ Olympia housing complex;
- ◆ Grounds of ENL head office in Yuzhno-Sakhalinsk.

Air quality monitoring at:

- ◆ Chayvo OPF;
- ◆ Chayvo WS;

- ◆ De-Kastri OET;
- ◆ Odoptu-2 WS (Northern);
- ◆ Odoptu-1 WS (Southern WS) construction site;
- ◆ Construction site of flowlines and engineering services;
- ◆ Orlan offshore platform;
- ◆ Grounds of ENL head office in Yuzhno-Sakhalinsk
- ◆ Olympia housing complex;
- ◆ Chayvo OPF Temporary Waste Storage Area (TWSA)
- ◆ De-Kastri Oil Terminal TWSA;
- ◆ De-Kastri Oil Terminal industrial and household waste landfill;
- ◆ Odoptu Wellsite 2 (Northern) TWSA.

Potable water quality monitoring at:

- ◆ Chayvo OPF;
- ◆ Chayvo WS;
- ◆ Orlan offshore platform;
- ◆ Berkut FOP
- ◆ De-Kastri OET;
- ◆ Odoptu-2 WS (Northern);
- ◆ Olympia residential complex;
- ◆ ENL head office.

Household wastewater quality monitoring at:

- ◆ Chayvo OPF;
- ◆ Chayvo WS;
- ◆ Orlan offshore platform;
- ◆ Berkut FOP;
- ◆ De-Kastri OET;
- ◆ Olympia residential complex;
- ◆ ENL head office;
- ◆ Odoptu WS 2 (Northern);
- ◆ residential camp Nogliki.

Monitoring of wastewater/produced water quality for injection at:

- ◆ Chayvo OPF;
- ◆ Orlan offshore platform.

Groundwater level and quality monitoring at:

- ◆ Chayvo WS;
- ◆ Chayvo OPF;
- ◆ De-Kastri OET;
- ◆ Odoptu-2 WS (Northern);
- ◆ Odoptu-1 WS (Odoptu SWS) area borrow pits;
- ◆ Chayvo OPF – De-Kastri OET main pipeline route.

Groundwater level monitoring:

Along the ROW of trunk oil pipelines Chayvo OPF – Uangi cape (Sakhalin Oblast), cape kamenny – De-Kastri OET (Khabarovski Krai).

Surface stream hydrology and morphology monitoring:

Conducted in 2017 at 146 water courses in places of their crossing with pipelines:

- ◆ Odoptu-2 WS (Northern) - Chayvo OPF Flowline
- ◆ Orlan – Chayvo Flowlines, including:
 - Gas re-injection flowline Chayvo OPF – Orlan OP.
 - Full well stream flowline Orlan OP – Chayvo OPF;
- ◆ Arkutun-Dagi field flowlines, including:
 - ◆ Produced water re-injection flowline Chayvo OPF – Berkut MDP.
 - ◆ Full well stream flowline Berkut MDP – Chayvo WS.
 - ◆ Trunk oil pipeline Chayvo OPF – De-Kastri OET.
 - ◆ Trunk gas pipeline Chayvo OPF – Botasino.

Seawater quality monitoring in:

- ◆ Chikhachev Bay near the Single-Point Mooring;
- ◆ Chikhachev Bay, near the treated wastewater outlet (for production water and surface runoff);
- ◆ Piltun Bay, near the Temporary Offloading Facility (TOF) operations site, around the berthing sites at the TOF, and near Cape Agivo;
- ◆ Sea of Okhotsk, near the area of treated water discharge from combined outlet No. 1 of the Berkut FOP;
- ◆ Sea of Okhotsk, near the site of plugged and abandoned wells Dagi 7-2 and Dagi-15.

Monitoring of water protection zones in:

- ◆ Chikhachev Bay, at the De-Kastri OET site;
- ◆ Piltun Bay, near TOF

Monitoring of marine life and bottom sediments in:

- ◆ Piltun Bay, along the underwater flowline crossing route

Monitoring of vegetation communities:

- ◆ Odoptu 2 WS (Southern) area;
- ◆ Along the construction route for of Odoptu NWS – Odoptu SWS flowlines and engineering services.

Topsoil monitoring at:

- ◆ Chayvo OPF TWSA;
- ◆ De-Kastri OET TWSA;
- ◆ De-Kastri OET industrial and household waste disposal facility area;
- ◆ Odoptu NWS TWSA;
- ◆ Odoptu-1 WS (Southern WS) construction site;
- ◆ Construction site of flowlines and engineering services
- ◆ Olympia housing complex site);

Geotechnical monitoring:

- ◆ Odoptu-2 WS (Northern) - Chayvo OPF Flowline.
- ◆ Orlan - Chayvo Flowlines, including:
 - Gas re-injection flowline Chayvo OPF – Orlan OP,
 - Full well stream flowline Orlan OP – Chayvo OPF.
- ◆ Arkutun-Dagi field flowlines, including:

- Produced water re-injection flowline Chayvo OPF – Berkut MDP,
Full well stream flowline Berkut MDP – Chayvo WS;
- ◆ Trunk oil pipeline Chayvo OPF – De-Kastri OET, section KP0-126
 - ◆ Trunk oil pipeline Chayvo OPF - – De-Kastri OET, section KP145-226;
 - ◆ Trunk gas pipeline Chayvo OPF – Botasino.
 - ◆ Chayvo OPF;
 - ◆ Chayvo WS;
 - ◆ De-Kastri OET;
 - ◆ Odoptu NWS;
 - ◆ Construction site for Odoptu SWS and flowlines and engineering services;
 - ◆ Odoptu NWS coastal zone lithodynamics;
 - ◆ Landfall area of Odoptu NWS – Chayvo OPF Flowline's underwater crossing of Piltun Bay;
 - ◆ Temporary Offloading Facility (TOF) area in Piltun Bay;
 - ◆ Pipeline abutment in the area of Chayvo WS;
 - ◆ Landfall area of the Oil Export Pipeline crossing of Nevelskoy strait at Uangy Cape.

Geodynamic (seismic and geo-deformation) monitoring

- ◆ Seismic activity monitoring;
- ◆ Geo-deformation monitoring at points where the oil export pipeline crosses active faults (Garomay and Central Sakhalin Faults).

Monitoring of physical impact factors at:

- ◆ Orlan OP;
- ◆ Berkut OP;
- ◆ Chayvo OPF;
- ◆ Chayvo WS;
- ◆ De-Kastri OET;
- ◆ Odoptu-2 WS (Northern);
- ◆ Construction site of flowlines and engineering services;
- ◆ ENL head office;
- ◆ Olympia residential complex.

3.3 Summary of 2017 Environmental and In-Process Monitoring Results.

Monitoring of stationary air emission sources

Monitoring of air emissions from the stationary sources at all Sakhalin-1 production facilities, camp and office blocks did not indicate any exceedance of maximum permissible emission standards with respect to the monitored parameters; compliance with the standards was made possible by timely equipment maintenance, use of high-quality fuel, and normal operating conditions

Air quality monitoring

The measured pollutant concentrations in all Sakhalin-1 facilities, temporary waste storage sites and the industrial/domestic waste landfill did not exceed the standard limits for residential and workplace air quality.

Potable water quality monitoring

Water samples for all parameters for the monitoring period conformed to GN 2.1.5.1315-03 Maximum Permissible Concentrations (MPC) of Chemicals in Domestic Water Supply and Recreational Water Bodies and SanPiN 2.1.4.1074-1 "Potable Water. Hygienic requirements to water quality in centralized drinking water supply systems. Quality Control".

Monitoring of Household Wastewater Quality

Monitoring of household wastewater quality at the intakes and outlets of treatment facilities allows ENL to monitor process efficiency and perform timely process adjustments to achieve the prescribed water quality standards for discharge into water bodies.

Quality monitoring of injected wastewater

Produced water treatment system at Chayvo OPF is intended to remove oil from water. After the treatment cycles, water is pumped into the flushing drum to remove light hydrocarbons and then injected into the disposal well. During injection activities, injection parameters are continuously monitored.

At the Orlan platform, household wastewater is passed through an electric dissociative treatment system in a wastewater treatment facility and is then injected from the storage tank into the disposal well. No wastewater is discharged into water bodies.

Monitoring of groundwater level and quality

Natural factors play a primary role in determining groundwater levels. Variations of groundwater levels throughout the observation period at all facilities have not exceeded natural seasonal variations. Groundwater quality analysis results remained stable by comparison with previous years of monitoring.

Hydrological, morphological, and hydrochemical monitoring of surface stream

Hydrological, morphological, and hydrochemical monitoring was conducted during the summer low-water period within the boundaries of 146 crossings by pipelines of the beds of rivers, anonymous streams, lakes, moist areas, bogs, marshes, etc., and yielded the following primary conclusions:

- ◆ At crossings over water bodies, there occurs overgrowth of the banks and bank slopes with hydrophilous grass and bushes, aided by additional engineering protection work at the crossings.
- ◆ Crossings of stream channels within the corridor are stable, and there are no traces of active stream bed deformations.
- ◆ The riverbank protection belts and water protection zones at all the water crossings are in good, stable condition.
- ◆ Hydrochemical analysis of water samples collected upstream and downstream of points where the pipeline crosses streams show no effect of the project on streams.

Monitoring of seawater quality

Chikhachev Bay. Treated wastewater (process and surface water) discharge area.

During the reporting period, sampling was performed before and after discharges. Laboratory test results confirm that the wastewater discharges had no effect on seawater composition and properties in the monitored aquatic area.

Chikhachev Bay. Single Point Mooring (SPM) area

The surveyed portion of the Bay area is exposed to heavy shipping traffic, as well as to the impact from the port of De-Kastri, consequently, the seawater samples occasionally exhibit concentrations of petroleum products and suspended solids exceeding MAC levels. However, no correlation between the instances of excessive petroleum product and suspended solids content in the water and the tanker loading operations was found

Piltun Bay. Temporary Offload Facilities (TOF) area.

During the reporting period, sea water sampling from the Piltun Bay was performed during barge offloading at the TOF, and during transport sea operations (in vessels berthing area at Cape Agivo and in the TOF area).

The hydrometeorological, morphometric, hydrological, and organoleptic parameters were in line with the environmental conditions in this area during the summer period.

Concentrations of suspended solids and total hydrocarbons at all sampling points were significantly lower than during the pre-construction period in 2008

Okhotsk sea area, near the area of treated water discharge from combined outlet No. 1 of the Berkut FOP.

Seawater sampling to determine the effect of discharges of mixed wastewater was conducted at three points within the 250 m radius around Berkut OP. Samples were taken from three depths for 17 parameters.

Content of pollutants in sea water did not exceed maximum allowable concentrations for fishery water basins.

Okhotsk sea area near plugged and abandoned wells Dagj 7-2 and Dagj 15.

These works represented a continuation of the annual environmental monitoring and were performed in order to assess the environmental conditions in the area of plugged and abandoned wells according to the Program of monitoring of plugged and abandoned wells Dagj 7-2 and Dagj-15 in the basin of north-western shelf of Sakhalin Island for the period from 2012 through 2020.

Visual observations failed to detect any oil sheen in the area. Concentration of petroleum hydrocarbons in seawater samples analyzed did not exceed the MACs prescribed for fishery sites.

*Monitoring of Water Protection Zones (WPZ)**Chikhachev Bay. De-Kastri OET Area*

Visual monitoring in the De-Kastri OET area was conducted in the Chikhachev Bay water protection zone. Monitoring showed no changes in the size of the areas overgrown with grass, shrubs, trees, and tree and shrub vegetation as compared to the findings of monitoring conducted in previous years.

Piltun Bay. Temporary Export Facilities (TOF) area

Based on the monitoring conducted in 2017, no ecosystem changes in the water protection zone and surrounding areas were identified. No visible erosion processes within the facility water protection zone were identified.

Monitoring of Marine Biota and Bottom Sediments

Monitoring marine biota along the pipeline crossing route in Piltun Bay has shown that the number of species in July 2017 remains at the same level as in July, 2016 - 27 and 28 benthic hydrobionts, correspondingly

Average benthos indices in 2017 were: density – 1563 ± 152 ind./m²; biomass – 204 ± 21 g/m²; zoobenthos biomass – 179 ± 20 g/m². The dominant species, as in the previous years, were bivalve mollusks *Macoma balthica*.

The microphytobenthos species composition in Piltun Bay was practically the same as in previous years.

For the bulk of the undersea vegetation in the Piltun Bay account *Zostera japonica*, *Zostera marina* and *Ruppia* - main benthos communities in the Bay. The total phytomass (stocks) of undersea vegetation on the pipeline route increased somewhat compared to the previous year and amounted to about 1204 tonnes (in 2016 – 1024 t; in 2015 – 979 t).

Thus, zoobenthos and macrophytobenthos communities in the Piltun Bay are stable.

Monitoring of plant communities

Results of flora monitoring in the Odoptu SWS area and along the flowline and utility construction route show that in the reporting year no significant changes in specific and cenotic vegetation characteristics on monitoring areas have occurred.

No rare plant species recorded in the Red Books have been identified. Vegetation on trial areas had no visible signs of human impact.

On certain monitored areas, increase in the number of plants species was observed

Topsoil monitoring

The chemical, microbiological, and parasitological indices of soil samples analyzed from project operating facilities, including flowlines and utilities and the De-Kastri landfill, comply with soil quality standards.

By results of visual inspection in the area of construction of the Odoptu SWS, flowlines, and utilities, there was no infringement on land allocation boundaries, no oil impacted areas were identified, and no deviations from designed environmental solutions were found.

In all sampling points (including background ones) concentrations of petroleum products were considerably below the level specified for defining the level of lands pollution.

Concentrations of all forms of heavy metals in samples at all stations was considerably lower than background levels

Geotechnical monitoring

Pipeline routes

A complete walk down inspection of all pipeline routes was carried out in June - August 2017, with the following conclusions.

- ◆ Identified exogenous processes have low potential for further development and do not represent a threat to safety of pipeline operation;
- ◆ The area of sites of active occurrence or intensification of geotechnical processes continues to decrease;

- ◆ The area of protective grass cover is from 60% to 100%.

Site facilities

The areas of exogenous processes at site operation facilities of the project (Chayvo WS, Chayvo OPF, De-Kastri OET, Odoptu NWS) are local and limited, and generally are manifested in the form of water erosion or aeolian processes associated with wind transfer of sand masses.

Suffosion (sagging) processes occur in isolated areas. The areas prone to waterlogging or seasonal flooding are insignificant.

The extent of caving, landslide and freeze-thaw processes is negligible and limited to small areas.

The exogenous processes observed are typical for the northern area, and the degree and extent of their development pose no threat to facility operations

Odoptu NWS coastal zone lithodynamics

The 2016 and 2017 surveys show that the coastal area in question is an active area in which the combination of meteorological, hydrological, and lithodynamic factors has a distinct effect on the underwater and above-water shore slope.

Alternation of sand accumulation and transfer processes within the same shore areas is characteristic of the whole Odoptu Spit shoreline section of the Sea of Okhotsk near the Odoptu NWS. The range of such "fluctuations" (from the water's edge) is 50 – 60 m. The situation is relatively stable within the first beach barrier, the surface of which under natural conditions is overgrown with grass and is not subject to intense erosion

Construction of Odoptu-1 WS (Southern), flowlines and engineering services.

At present, there are no sites of exogenous processes development representing danger to the facility and requiring execution of off-schedule restoration work.

The condition of flowline corridor is assessed as satisfactory and stable.

Area of Temporary Offloading Facilities (TOF) for the Sakhalin-1 Project. Odoptu Onshore Facilities. Odoptu North Well Site Expansion

A complete walk down inspection revealed that the south side of TOF is more susceptible to wave erosion throughout the structure, with the exception of the sheet pile wall. The north side of TOF is more stable, but minor traces of wave erosion were found there as well.

Wind processes (deflation and accumulation of sand deposits) were quite extensive in the TOF infill slopes. The primary processes observed were accumulative and accumulative-deflation forms associated with wind transfer.

No deformation changes in the TOF abutment area were identified.

There were no significant shifts in the above-water beach position near TOF compared to survey data from past years.

The TOF has been dismantled

Pipeline landfall areas

Geotechnical processes were monitored to assess the changes in the shore and the underwater slope at the pipeline abutments.

Odoptu NWS – Chayvo OPF pipeline underwater Piltun Bay crossing landfall area

Essential changes in the position of the coastal slope at pipeline abutment in the eastern and western coast of the gulf have not occurred. The distance from the benchmark to the beach terrace edge has changed insignificantly: from -0.1 m to +0.4 m. Such changes are a consequence of the natural erosive processes occurring under the influence of meteorological factors.

Since 2016, there are slight changes in the sea bottom elevation – up to 0.5 m. Changes in the east channel depths were due primarily to higher current speeds, which altered the seabed topography.

Chayvo WS pipeline abutment area

A stable position of the beach terrace edge was recorded on practically all the survey lines except benchmark 112, where the edge position shifted 16 m shoreward during the period of 2016 - 2017. However, it does not pose any risk, because there are no industrial facilities in the zone of storm effects.

The situation is stable along the whole coast-strengthening structures. Provided coast protection performs its functions.

Pipeline landfall area in Nevelski strait near Uangy Cape

Changes in the position of the terrace edge were noted along the entire surveyed area. Terrace edge retreat in the coast direction was from 0.9 to 16 meters. The recorded beach zone increase - from 5 to 50.6 meters.

Due to accumulation of sand deposits carried over from the coast, the depth of the underwater coastal slope is decreasing

Defining pipelines construction depth within the beds of crossed water bodies.

Works carried out in June-August 2017 within boundaries of 146 sites of pipelines crossings of water bodies' beds. Current dynamics of natural processes was assessed at 179 sites, and also estimation of their further development was made.

Geodynamic (seismic and geo-deformation) monitoring

In 2017, geo-deformation monitoring measurements were conducted at locations where the pipeline crosses the Central Sakhalin and Garomay faults aiming to identify and quantify deformations of geological environment caused by tectonic activity in the fault zones. Geo-deformation monitoring in the Garomay fault zone in 2006-2017 primarily traced unidirectional tectonic movements. Minor alternating movements with amplitudes up to 4-5 mm and a period of 8-10 years are exhibited only in individual components of the horizontal displacements. Speeds of horizontal deformations in the zone of the Central-Sakhalin fault have been very small during the whole monitoring period.

Speeds of horizontal deformation in the Garomay fault zone, during the whole monitoring period were also rather small, and have not exceeded 1.2 mm/year. There is a right-side shift at a slip rate of 1.6 mm/year in the Garomay fault zone. Such kinematics of the Garomay fault agrees with geological studies and regional geodynamic surveys data in the north of Sakhalin. No significant vertical displacements have been detected on either side.

Possible ground movements in the areas where the pipeline crosses the Garomay and Central Sakhalin faults as a result of local and remote earthquakes are negligible and have no effect on the slip rates of local grid stations.

During the period from the 1st of January through the 31st of December 2017, 173 seismic events with the magnitude $ML \geq 1.0$ were recorded in the monitored zone, and of these 126

local earthquakes were localized. Spatial pattern of seismic activity distribution in the monitoring zone during the reported period is generally similar to patterns recorded during the previous survey periods.

3.4 Key environmental protection and monitoring programs on Sakhalin

Western gray whale monitoring

In 2017, ENL with the assistance of specialists from the Institute of Marine Biology (IBM) of the Far East Branch of the Russian Academy of Sciences (DVO RAN), the Pacific Oceanographic Institute (TOI) of DVO RAN, and Sakhalin State University continued to study ecological aspects of the distribution and condition of gray whales feeding off the northeast coast of Sakhalin Island during the summer-fall season.

Surveys were conducted in accordance with programs approved by the relevant Russian Federation agencies. Office processing and analysis of the extensive field data obtained in 2017 is underway at present. Completion of the final reports is expected in 2018.

Preliminary data indicate that the status of the Sakhalin feeding grouping is stable. As in the previous years, the whales foraged in the two well known feeding areas in the offshore waters of northeast Sakhalin Island from summer to fall. The photo ID catalog contains 283 whales and is updated regularly.

The ENL Marine Mammal Protection Program has been updated and implemented successfully during the summer and fall marine and coastal operations. In 2017, not a single incident involving marine mammals was recorded.

Surveys of Pinnipeds in Piltun Bay

In 2017 ENL, with the assistance of specialists from the Pacific Oceanographic Institute, conducted studies on pinnipeds at the mouth of the Piltun Bay. Surveys were aimed at assessing the numbers and species structure of pinnipeds in the area and defining their spatial-temporal dynamics.

Surveys in the last four years confirmed that the scenario of seasonal variations in the pinniped population is generally similar: the total number of seals on land is related to qualitative and quantitative variations in food resources. The Highest number of pinnipeds recorded at the rookery in 2017 (2596) was higher than 2015 (2473) or 2016 (2024) but lower than 2014 (2620).

Implementation of the Marine Mammals Protection Plan During Operations in Piltun Bay

Under expansion of the existing Odoptu onshore facility, barges with large-size modules were towed in the Bay. An ocean-going tug towing a barge would arrive to the waiting and transfer site; shallow-draft tugs towed the barges from the transfer site to the Temporary Offloading Facility (TOF) inside Piltun Bay. The modules were offloaded at the TOF and transported to

Odoptu site. The shallow-draft tugs towing an empty barge returned to the barge transfer zone. Six shallow-draft tugs were employed in towing barges in and out of the Piltun Bay.

The Marine Mammals Protection Plan (MMPP) has been developed to mitigate impacts on the gray whales during the sealift of the large-size modules.

The MMPP provided for implementing and strictly enforcing mitigation measures designed to minimize the impacts of offshore activities on marine mammals. To ensure compliance with the MMPP purpose, different approaches were adopted based on the vessel activity, operations area, and cruise durations. The MMPP included the following key mitigation measures:

- The sealift operations were implemented in the earliest possible time after ice clearance, before arrival of the main herd of whales;
- Vessel top speed limits were enforced as a key measure;
- The sea tug waiting site was extended toward open sea to increase the distance to the whale feeding area;
- A short duration of noise release episodes and small noise footprint were ensured;
- Marine Mammal Observers (MMOs) were stationed onboard each of the shallow-draft tugs and at two onshore stations: at Piltun Bay mouth (station #9) and on the Piltun lighthouse.

Additional measures were also in place:

- Equipment for real time acoustic monitoring was used: four acoustic stations transmitted data on propagation of sound from operating vessels;
- Onshore infrared (IR) system was used for detection of whales; it consisted of 9 cameras and software and hardware that allowed to detect whale spouts in the nighttime and calculate the animals' location coordinates. This data as well as information about vessels' locations was transmitted to the command center that controlled the marine operations, coordinated vessel activities and supervised compliance with the mitigation measures set forth in the MMPP.



The Marine Mammals Protection Plan was successfully implemented during the 2017 ENL sealift:

- No incidents with marine mammals were registered. The risks of harmful interactions, including collisions between vessels and marine mammals, were mitigated by MMPP compliance. No safety incidents were registered;
- The Marine Mammals Protection Plan developed to mitigate impacts on gray whales is based on the results of the multi-year monitoring program and the outcomes of the Plan implementation;
- The MMPP was successfully implemented during 2016 sealift of 11 barges and of 7 barges in 2017 without incidents or any significant changes in the distribution of mammals;
- In 2017, 7 barges were delivered in the earliest possible time after the ice clearance, before arrival of the main herd of whales;
- The 2017 MMPP used new technologies for whale detection and real-time acoustic monitoring.

In the 2017 regular marine operations, ENL implemented mitigation measures in compliance with the MMPP during ENL's periodic and regular operations:

- Marine Mammal Observers (MMOs) were stationed on the key vessels and Watch Standers were on non-key vessels to ensure compliance with MMPP requirements;
- Training was provided to MMOs, Watch-Standers and crew of all vessels to enable MMPP compliance and the implementation of appropriate mitigation measures;
- During the 2017 field season, the applied mitigation measures included correction of the vessel's course and speed reduction to avoid disturbance of marine mammals and hazardous proximity

Throughout the entire time of ENL operations, not a single case of marine mammal injury was registered. The data of the multiyear monitoring make it possible to state that the measures have been successfully implemented to mitigate impacts both on the gray whale population and generally, on all the marine mammals

Monitoring the status of bird populations registered in the Red Book of the Russian Federation and the Red Book of Sakhalin Oblast.

Temporary Offloading Facilities (TOF) construction site in the Piltun Bay and the Okhotsk Sea coastal area

Data acquired in 2017 confirm the conclusions of 2014 and 2016. The range of human disturbance impacts during the execution of works connected with the TOF operation of the TOF does not exceed a few dozens of meters for sandpipers and gulls, 200-400 meters for diving ducks, 400-700 meters for clusters of dabbling ducks numbering up to 1000 birds, and 1.2 km for clusters of dabbling duck flocks larger than 1000 birds. The closest major Aleutian tern colony is 2.5 km from the TOF.

In 2017, on the marine spit of the Piltun Bay, in the area of Sakhalin-1 facilities arrangement, the nesting conditions of species recorded in the Red book was satisfactory:

The Aleutian tern nested on the marine spit with high density (87.1 pairs/km²). The number of nesting Aleutian terns within the monitored site and on adjacent territories tends to increase during the past 6 years.

Aleutian tern (Sakhalin subspecies) is nesting on the monitored site with a density of 32.4 pairs/km². Total number of Aleutian terns nesting on the marine spit between the Odoptu-2 WS and the Odoptu-1 WS on the area of 5 km² is estimated as 166 pairs. Directly in the 1-km monitoring zone, 94 nesting areas of this species is mapped. The number of nests of this species demonstrate a certain positive trend.

Other protected species (northern phalarope, black-tailed godwit, ruffs) continue to nest within the monitored site. The Steller's sea eagle and the white-tailed eagle use the zone of works as their feeding areas.

The number of colonially nesting species (common tern and black-headed gull) is stable. Their habitats have not been disturbed by project facilities construction and operation.

Swans are preserving their traditional travel routes and migration gathering locations, the largest of which are 4 km to the north of TOF. There is a slight change in the flight route for the approach of birds from the south in the mooring area which has no major significance for the migration of the group. All communities are in their initial condition, in which have been before the beginning of construction.

Section of the export pipeline in Khabarovsk Krai and the flowline section from the Odoptu NWS to the Chayvo OPF

During ornithological monitoring in 2017, no changes in distribution and the number of main checked species within the monitored sites identified.

The number of Aleutian terns in the area of Chayvo WS - Chayvo OPF has restored up to practically the background state, including sites adjacent to the flowline.

Congestions of mewing in Piltun Bay formed in about the same areas as in the pre-construction period. Their number remains stable and amounts to about 15 thousand birds. New areas of mewing congestions were revealed; these are located near the western coast of the bay.

During the migration period, the Piltun Bay serves as a place of a simultaneous stopping and feeding for up to 100 thousand of Tundra Swans that amounts to about 70 % of the Asian population of this species. Birds' distribution across the bay depends only on hunters' activity.

The total number of waterfowl simultaneously present in the bay in 2017 was high and reached 200 thousand species.

Migrating carnivorous birds, including rare species (peregrin falcon, white-tailed eagle, Steller's sea eagle) in the operation are encountered at the coast of the Piltun Bay, both near the industrial facilities of the company and at the adjacent territories.

Areas most important for maintaining large congestions of fall migrants located in the northern, middle and southern part of the Piltun Bay have preserved their significance. However, hunting activities in the area of Wrangel islands constrains formation of large birds' congestions on this site, but despite it, the territory preserves its major importance as a place of stopping for migrating waterfowl.

3.5 Compensation for Damage to Aquatic Biological Resources

In 2017, ENL performed a number of activities on artificial reproduction of water bioresources in order to compensate damage to water biological resources and their habitat at realization of economic activity in the territory of the Sakhalin Region and Khabarovsk Krai.

In the territory of the Sakhalin Oblast, in the framework of "Sakhalin-1 Project. Arkutun-Dagi field. Onshore and Offshore Structures" (platform operation during 39 years, including the construction of a group of wells while continuing operation of the fixed platform "Berkut") at the licensed Arkutun-Dagi site (2016-2054)", in the fishery basin of the Tym River (East-Sakhalin subzone) were released 2,453,529 juvenile chum salmon valued at RUB 9,249,804.33 grown by the ENL order at Ado-Tymovsk fish-breeding factory of FGBU "SakhalinRybVod".

In the territory of the Khabarovsk Krai, the following compensatory activities at a total cost of RUR 101,352.70 were realized according to two survey programs:

1) «*The program of integrated marine engineering surveys to prepare design documentation for Sakhalin-1 Project facility. The Far-East Liquefied Natural Gas Production Plant (LNG). Marine Offloading Terminal*». Into the Amur river basin, 10 species of juvenile Amur sturgeon grown at the Anuisk Sturgeon Fish-breeding factory. The cost of works according to the agreement with FGBU AmurRybVod amounted to RUR 1000.

2) «*The program of integrated marine engineering surveys to prepare design documentation for Sakhalin-1 Project facility. Chayvo OPF - De-Kastri Oil Export Terminal Flowline. Tatar Strait crossing*». In the Bidzhan river (Amur river basin), from Bidzhansky fish-breeding factory of FGBU AmurRybVod, 16,866 species of juvenile Siberian salmon were released for the sum of RUR 100,352.70.

ENL SHE Performance Results 2014-2017

№	Environmental Performance Commitments	2014 Environmental Performance indicators relative to oil production	2014 Environmental Performance indicators relative to oil and gas production	2015 Environmental Performance indicators relative to oil production	2015 Environmental Performance indicators relative to oil and gas production	2016 Environmental Performance indicators relative to oil production	2016 Environmental Performance indicators relative to oil and gas production	2017 Environmental Performance indicators relative to oil production	2017 Environmental Performance indicators relative to oil and gas production
1	Specific index of pollutants gross emissions (includes also items 2,3,4,5) (kg/t of fuel equivalent)	1,42	1,18	2,16	1,75	1,00	0,55	3,47	2,2
2	Specific index of Sulfur Dioxide (SO ₂) emitted (kg/t of fuel equivalent)	0,016	0,012	0,012	0,010	0,010	0,0055	0,009	0,0056
3	Specific index of volatile organic compounds (VOC) emitted (kg/t of fuel equivalent)	0,47	0,38	0,42	0,34	0,31	0,17	0,28	0,18
4	Greenhouse gas (Methane) emitted (kg/t of fuel equivalent)	0,012	0,012	0,053	0,043	0,020	0,011	0,008	0,005
5	Specific index of Nitrogen oxides (NO ₂) emitted (kg/t of fuel equivalent)	0,29	0,22	0,37	0,30	0,20	0,11	0,27	0,17
6	Associated petroleum gas utilization level (%)	97,65%	97,65%	95,33%	95,33%	97,1%	97,1%	97,5%	97,5%
7	Contaminated waters disposal into surface water bodies (m ³ /t of fuel equivalent)	0	0	0	0	0	0	0	0
8	Water intake (m ³ /t of fuel equivalent)	0,82	0,65	1,20	0,97	1,02	0,56	1,20	0,77
9	Ratio of other industrial and domestic wastes disposed and treated to the total other industrial and domestic wastes in circulation (balance of other industrial and domestic wastes as at year start + other industrial and domestic wastes generated over the year) *(t/t)	0,67	0,67	0,91	0,91	0,908	0,908	0,92	0,92
10	Contaminated land area at year end to year beginning ratio (ha/ha)**	0	0	0	0	0	0	0	0
11	Specific accident rate on pipelines resulting in oil/condensate/product/formation waters spills (cases / 1 km of pipelines)	0	0	0	0	0	0	0	0
12	Specific volume of oil and petroleum products spills (kg/t of fuel equivalent)	0,000018	0,000015	0,000029	0,000024	0,000048	0,000027	0,00013	0,000079
13	Share of above-norm payments in the total environmental payments (ratio of environmental payments for above-norm discharges, emissions and waste disposal to total environmental payments for the reporting year)	0	0	0	0	0	0	0	0
14	Emergencies with significant (high-profile public impact) socioeconomic damage	0	0	0	0	0	0	0	0

* Drilling waste and wastewater injected through special-purpose wells account for 94.8% of total waste generation in 2014, 96.7% of total waste generation in 2015, total waste generation (including the produced water amount) 99,7% in 2016 and total waste generation (including the produced water amount) 99,6% in 2017. The combined amount of these two types of waste is excluded from review in order to keep the data representative.

** Due to the lack of land contaminated as a result of oil and petroleum products spills, the remediation of the contaminated land was not carried out

Nº	Safety and Health Commitments	2014	2015	2016	2017
1	Lost-time incident rate – employees (per 200000 work hours)	0,26	0,00	0,00	0,00
2	Lost-time incident rate – contractors (per 200000 work hours)	0,00	0,05	0,00	0,026
3	Lost-time incident rate – total workforce (per 200000 work hours)	0,04	0,04	0,00	0,023
4	Total recordable incident rate – employees (per 200000 work hours)	0,52	0,18	0,00	0,00
5	Total recordable incident rate – contractors (per 200000 work hours)	0,20	0,14	0,03	0,053
6	Total recordable incident rate – total workforce (per 200000 work hours)	0,26	0,15	0,03	0,046
7	Fatalities - employees	0,00	0,00	0,00	0,00
8	Fatalities - contractors	0,00	0,00	0,00	0,00
9	Fatal accident rate – total workforce (per 1 000 000 work hours)	0,00	0,00	0,00	0,00