SAKHALIN-1 PROJECT
REPORT ON ENVIRONMENTAL PROTECTION ACTIVITIES

EXXON NEFTEGAS LIMITED

2016

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1 HEALTH, SAFETY, AND ENVIRONMENTAL PROTECTION IN 2016

In 2016 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 13th 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.

There were no accidents or incidents at Exxon Neftegas Limited facilities in 2016, including oil or oil products spills, involving significant social or environmental damage that caused public outcry.

2 2016 ENVIRONMENTAL PERFORMANCE

ENL pays special attention to environmental measures and tracks various environmental performance indicators and parameters on a daily, monthly, quarterly, and annual basis. A summary of the Sakhalin-1 environmental performance indicators is provided in this Section.

2.1 WASTE MANAGEMENT

The data presented in this section are consistent with the Exxon Neftegas Limited State Statistical Report on Form 2-TP (Waste) for 2016.

Drilling and Domestic Waste

In 2016 Sakhalin-1 Project construction and production facilities in Sakhalin Oblast and Khabarovsk Krai generated 125,397 tonnes of drilling waste, 38,962 tonnes of industrial, and domestic wastewater and 7, 453.9 tonnes of industrial and domestic waste.

Produced water – 2,175,877 tonnes. The entire volume of produced water was injected into a special well at the Chayvo OPF (Garomai subsoil license block).

Drilling wastewater was injected through special-purpose wells into deep horizons of the license blocks:

- at the Chayvo onshore subsoil area;
- at the Chayvo offshore subsoil area;
- at the Arkutun-Dagi field subsoil area.

A total of 1,469.500 tonnes of drilling waste (including 9 tonnes carried over from the previous year) was transferred to the licensed company Terra-Torf LLC for disposal, and 1.5 tonnes of drill cuttings were transferred to the licensed company Eagle LLC for neutralization.

Domestic wastewater from the Orlan Offshore Platform amounted to 21,403 tonnes.

Domestic wastewater from the Orlan Offshore Platform was injected at the Chayvo offshore subsoil area.

Domestic wastewater from De-Kastri Oil Export Terminal (OET) amounted to 17,559 tonnes.

The entire volume of domestic wastewater from De-Kastri OET was transferred to the Municipal Unitary Enterprise De-Kastri Rural Settlement Housing and Utilities for neutralization.

Hence produced water, drilling waste, and wastewater account for 99.7% of the total volume of waste generated in 2016.

Industrial and Domestic Waste

Industrial and household waste generated by ENL in 2016 amounted to 7,453.9 tonnes.

Of the total volume of waste generated and carried over from 2015, 7,656.4 tonnes (or 99.5%) of the industrial and domestic waste of Hazard Classes 1-5 was neutrlized, buried, or recycled in 2016, including:

Waste Neutralization

6.8% of the waste was processed by thermal treatment in the company's own incinerators.

14.6% was transferred to contractors and subcontractors for treatment using special-purpose equipment.

Waste Recycling

13.9% of waste was reused for the main production operations (returned to the process) or for auxiliary processes.

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.

55.6% of the waste generated was transferred to outside contractors for recycling, including: wood waste, plastic and polyethylene waste, cardboard, paper, ferrous and non-ferrous scrap metal, printer cartridges, machinery, tires, ash, construction waste, food waste, stabilized sludge from biological treatment plants, plant waste from landscaping activities (care of lawns and flower beds) on the grounds of industrial facilities and company offices, etc.

Waste Burial

8.07% of Hazard Class 4 and 5 waste were sent to a specialized solid domestic waste landfill of Chistyy Gorod LLC in Nakhodka for disposal.

0.19% of industrial and domestic waste of Hazard Classes 4 and 5 was sent to the Company's own landfill in De-Kastri for disposal.

0.1% of Hazard Class 2 and 3 waste was transferred to the Serebristyy special-purpose landfill (Zelenyy Gorod, LLC, Krasnoyarsk) for burial;

0.23% of other process waste was injected into isolated horizons of the license areas through specialized wells.

Summary Data on ENL Industrial and Domestic Waste Management in 2016

Waste management	%
Recycling, total: including: - transferred for recycling - recycled at Company's own facilities	69.5% 55.6% 13.9 %
Neutralization (burning in incinerators)	21.4%
Burial, total:	8.17%

Use of Best Available Waste Management Technologies

Waste Neutralization

ENL's waste management strategy is aimed at environmentally sound waste management and reduction of waste burial volume.

In accordance with the draft technical documentation "*Incineration of Industrial and Domestic Waste at Sakhalin-1 Project Facilities,*" which received a positive State Environmental Expert Review finding, ENL has been updating the fleet of incinerators at the main Sakhalin-1 production facilities.

As part of this project, in 2015 ENL replaced four Forsazh-1 incinerators with SMART ASH units that are more environmentally friendly (two at Chayvo and two at Odoptu) and put into service a special-purpose UZG-1M unit for decontamination of oily sludge and contaminated soil. Three new stationary incinerators were ordered in 2016, and installation of the units is scheduled for 2017-2018 at the Odoptu North well site, the Chayvo OPF, and the De-Kastri OET.

Waste Disposal

The main objectives of ENL in the field of waste disposal are the efficient use of available capacities of waste disposal facilities and the use of environmentally acceptable methods of waste disposal.

ENL injects drilling waste and produced water into isolated zones of the subsoil license areas. This method is generally recognized as the most environmentally safe method of handling drilling and oil production wastes.

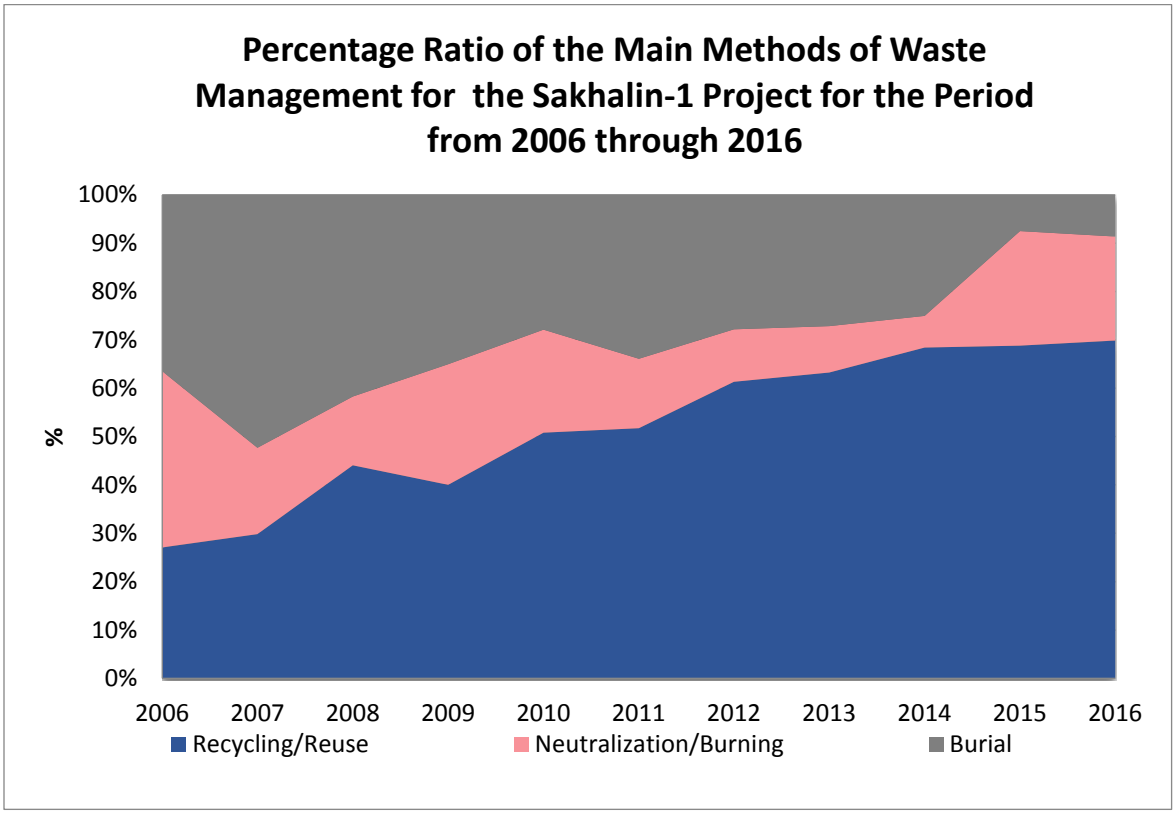
Recycling

The main focus of waste management is identification of waste generation sources and selective collection of wastes that can be reused in key process operations or transferred for recycling as secondary raw materials.

The company has steadily expanded the list of contractors for waste recycling and reuse and the list of wastes handled by those contractors. Approval of new contractors is based on onsite audits conducted by ENL at waste recycling facilities.

The overall level of recycling of industrial and domestic waste generated at ENL facilities in 2016 was 69%. This result was made possible by high production standards, thorough waste segregation and the use of waste management expertise to avoid potential burial and/or secondary contamination of potentially recyclable waste.

The graph below shows an overall percentage breakdown of the main methods used to manage Sakhalin-1 industrial and domestic wastes for the period from 2006 through 2016.



The total amount of miscellaneous industrial and domestic waste recycled and neutralized in 2016 was 6,995.7 tonnes.

Development of Infrastructure for Environmentally Safe Waste Removal, Neutralization, and Disposal

Within the scope of development of infrastructure for environmentally safe waste removal, neutralization, and disposal, the Company conducted the following activities in 2016:

As part of the reorganization of the Chayvo central temporary waste storage area, an auxiliary canopy was installed, repairs were made to the administrative unit, repair of hard surface in the open waste storage area continued, and a new waste recycling press was installed.

A major overhaul was performed on the drill cuttings storage pit at Chayvo WS.

New containers were purchased for waste collection at Odoptu NWS.

Monitoring of Waste Management Facilities

In compliance with Russian environmental protection laws and regulations, ENL performs environmental monitoring at sites where waste management facilities are located.

Monitoring is performed under the "Environmental Monitoring and In-Process Environmental Oversight Program for the Operation Phase" approved by the State Environmental Expert Review.

Under this program, monitoring is conducted at the waste disposal landfill in De-Kastri, temporary waste storage sites at the Chayvo OPF, Odoptu WS, and De-Kastri OET, incinerators, and injection wells. Monitoring includes the soil condition, air emissions from the incinerators, and groundwater quality in the areas of the landfill and the temporary waste storage sites.

The properties of the drilling waste and produced water injected and the technical parameters of the injection processes are monitored in accordance with the requirements of the RF authorized subsoil use agencies.

The results of monitoring at waste disposal sites in 2016 showed that the parameters monitored generally met environmental quality standards.

2.2 WATER USE, WATER CONSUMPTION, AND WASTEWATER DISPOSAL

The data presented in this section are consistent with the Exxon Neftegas Limited State Statistical Report on Form 2-TP (Water Management) for 2016.

ENL does not discharge wastewater from contaminated sewage into surface water bodies. The most effective available wastewater disposal technology is injection into a disposal well. The industrial and domestic wastewater from Sakhalin-1 Project facilities is injected into specialized wells, sent to treatment facilities and leach fields. Uncontaminated wastewater (cooling water and water from desalination systems) is discharged into the sea.

During construction and production operations under the Sakhalin-1 Project in 2016, ENL conducted water management activities pursuant to six Decisions and four Agreements for the use of surface water bodies and four subsoil licenses for underground water production.

Water consumption totaled 16,397,000 cubic meters. Water disposal was 16,005,000 cubic meters.

Orlan Offshore Platform

Water use on the Orlan Platform during the reporting year was based on three Water Use Agreements and three Water Use Decisions.

Sea water intake in 2016 totaled 4,782,000 cubic meters. The prescribed seawater intake limit is 10,908,000 cubic meters/year.

Water disposal:

- Standard clean water used for the equipment cooling and fire pump testing systems was discharged into the sea in the amount of 4,668,000 cubic meters.

- Standard clean water from the desalination system was discharged into the sea in the amount of 103,700 cubic meters.

- Household wastewater treated electrochemically in the Omnipure 15 MX treatment unit was injected into the injection well together with drilling waste, wash water from production areas, and storm water from the decks.

The total of all categories of wastewater injected into the well in 2016 was 23,900 cubic meters.

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

Water use:

A total of 130,800 cubic meters of fresh water for the Chayvo WS and the Chayvo OPF was taken from underground sources based on a subsoil license.

Water disposal:

- After treatment at the biological sewage treatment facilities at the Chayvo WS and the Chayvo OPF, 80,200 cubic meters of wastewater was discharged to leach fields.

- Process wastewater was discharged into a storage pond in the Chayvo OPF process area through a standard surface drainage system, after which it was injected into injection wells for the disposal of produced and other process waste.

- The water used to mix drilling mud was injected into a special well at the Chayvo WS as a slurry component.

De-Kastri Oil Export Terminal, Export Oil Pipeline, and Single-Point Mooring (SPM) in Khabarovsk Krai

A total of 22,200 cubic meters of fresh water was taken from underground sources based on a subsoil license.

Water disposal: domestic wastewater in the amount of 16,900 cubic meters and water from filter flushing after treatment at the biological treatment plant in the amount of 400 cubic meters was transported to the De-Kastri treatment facilities.

Precipitation leachate from the industrial and domestic waste landfill was transported by truck from the storage tanks at the landfill to the terminal's treatment facilities.

Surface runoff from the terminal area was directed to a system of settling ponds. Treated wastewater in the amount of 77,300 cubic meters was discharged into the sea in accordance with permits.

Odoptu Well Site 2 (North).

Water for the Odoptu NWS, including the multipurpose building and the drilling camp, was supplied from the Odoptu-4 and Odoptu-5 water intake facilities owned by EON LLC.

Water consumption totaled 115,900 cubic meters:

Water from the Odoptu-5 water intake in the amount of 13,500 cubic meters was used for hydrotesting of the produced water tank, dust suppression, and drilling purposes.

Domestic wastewater in the amount of 114,900 cubic meters was treated and discharged to the leach fields.

Berkut Fixed Offshore Platform

The Berkut fixed offshore platform is located off northeast Sakhalin island in the Sea of Okhotsk, within the exclusive economic zone of the Russian Federation.

According to Official Interpretation No. VN-02-28/4462 of September 20, 2011, from the RF Federal Water Resource Agency, the provisions of the RF Water Code applicable to the water use contracts and to decisions to allocate water bodies for use do not apply to the water areas of any water bodies located in the RF exclusive economic zone.

Seawater intake in 2016 totaled 11,278,000 cubic meters.

Discharge into the sea:

- The total amount of treated wastewater discharge from the platform into the sea (industrial, domestic, coolant system) was 10,917,600 cubic meters.

2.3 AIR EMISSIONS

The data presented in this section are consistent with the Exxon Neftegas Limited State Statistical Report on Form 2-TP (Air) for 2016.

Flared Gas Volume

The 2016 flaring level for the Sakhalin-1 Project is 2.9%.

Air Pollution Emissions

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 tonnes/year (including NO_X as NO_2 equivalent). The actual emissions for the reporting period amounted to 16,128.6 tonnes/year (including NO_X as NO_2 equivalent), which is 0.55 kg/TFOE relative to the volume of oil and gas produced in 2016.

Total authorized air pollutant emissions for Sakhalin Oblast (according to the permits issued) were 58,639 tonnes/year (including NO_X as NO_2 equivalent). Actual emissions for the reporting period were 13,060 tonnes/year (including NO_X as NO_2 equivalent).

Total authorized air pollutant emissions for Khabarovsk Krai were 4,065.5 tonnes/year (including NO_X as NO_2 equivalent). Actual emissions for the reporting period were 3,068 tonnes/year (including NO_X as NO_2 equivalent).

Actual 2016 emissions of all pollutants and total emissions at all company sites did not exceed the authorized emission limits.

2.4 OIL SPILL RESPONSE

Oil and Petroleum Products Spills

In 2016, 30 minor oil and petroleum product spills as a result of construction and production activities were recorded at ENL facilities, of which 29 occurred at production sites in Sakhalin Oblast, and 1 occurred at the production site in Khabarovsk Krai.

The total volume of spilled oil and petroleum products was 787.54 liters. All these spills occurred within boundaries of the company's industrial sites and were immediately and fully cleaned up.

The main reason for such spills/leaks of petroleum products such as hydraulic fluids, lubricating oils, diesel fuel is the failure of mechanisms of heavy machinery and motor vehicles used in production activities at the Sakhalin-1 Project sites. Due to the start of construction at the Odoptu Well Site 2 (South) and repair of the piping network at the production site of the Chayvo Onshore Processing Facility, the volume of oil and petroleum products spills/leaks increased slightly in 2016 compared to 2015. 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.

Approval of the New Sakhalin-1 Corporate OSR 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:

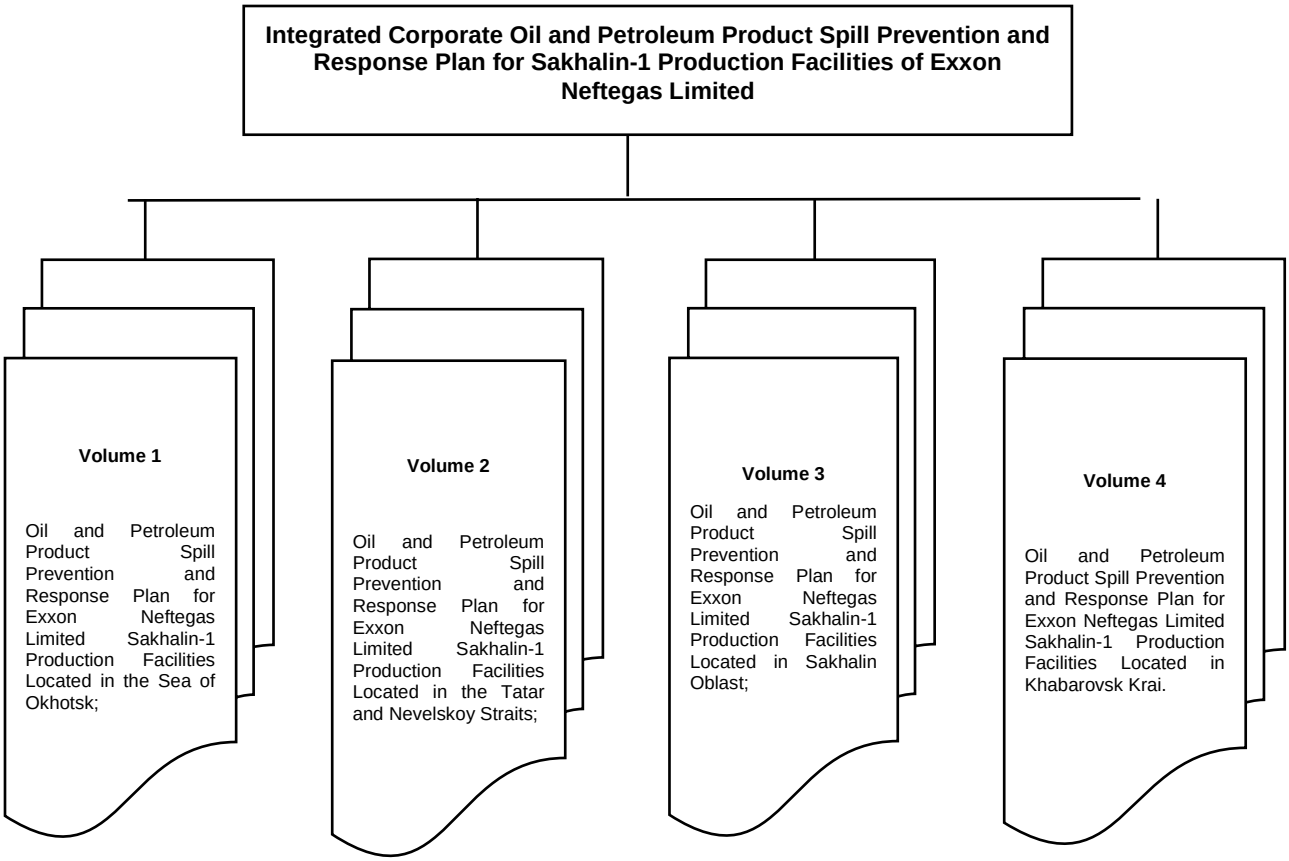
initiate timely and effective response to oil and oil product spills in compliance with the laws of the Russian Federation using manpower and resources of the company, contractors, and government organizations;

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 and enacted by ENL Order No. 726 of September 23, 2016, 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 Procuts Spill Prevention and Response in the Russian Federation."

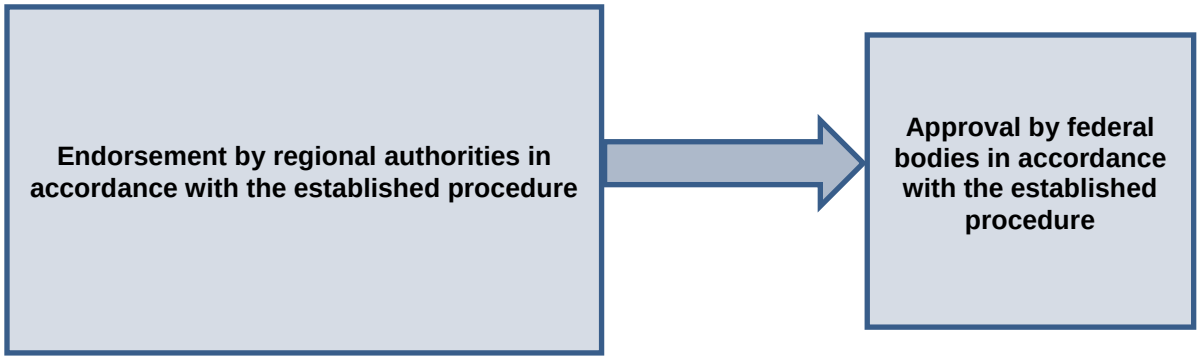
OSR Plans for production facilities in the Russian Federation were endorsed by the RF MChS Central Directorates for Sakhalin Oblast and Khabarovsk Krai, the Rf MChS Far East Regional Center, the territorial departments of Rostekhnadzor, and executive bodies of Sakhalin Oblast and Khabarovsk Krai and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



Procurement of OSR Equipment in 2016

The following marine OSR equipment was purchased in 2016: container-type hydraulically operated oil spill booms, repair kits, Lamor power unit, and other OSR equipment.

ENL acquires OSR equipment from the world's largest 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.

2.5 EXPENDITURES FOR ENVIRONMENTAL PROTECTION

The data presented in this section are consistent with the Exxon Neftegas Limited State Statistical Report on form 18-KS "Information on Investments in Fixed Assets Intended for Environmental Protection and Rational Utilization of Natural Resources" for 2016.

Each Sakhalin-1 Project facility includes a variety of environmental protection measures and equipment as a component of the design solutions and implementation activities. Design solutions include the use of the latest environmental protection equipment and most the environmentally friendly technologies. The table below shows ENL expenditures for environmental protection in 2016.

Expenditures for Environmental Protection Programs in 2016

Category	Environmental Protection CAPEX (thous.Rub)	OPEX (thous.Rub)
Regulatory/environmental technical personnel	320,766	36,695
Land reclamation	0	97,845
Water protection	0	10,465
Air protection	175,162	110,490
Waste management	2,836	436,866
Gray whale studies	28,253	138,037

Category	Environmental Protection CAPEX (thous.Rub)	OPEX (thous.Rub)
Monitoring bird populations listed in the RF Red Book	4,301	7,418
Environmental and in-process compliance monitoring	6,880	96,387
Environmental surveys	39,801	0
Oil spill response activities	183,772	500,184
TOTAL	761,771	1,434,387
		2,196,158

2.6 PAYMENTS FOR THE USE OF NATURAL RESOURCES

The data presented in this section are consistent with the Exxon Neftegas Limited State Statistical Report on form 4-OS "Information on Current Environmental Protection Costs and Environmental Payments" for 2016.

Russian Federation law and the Sakhalin-1 Production Sharing Agreement provide for charges for land, forest, and water use related to project facilities. The 2016 payments in this category are listed in the Table below. No excess payments were made for adverse environmental impact.

Payments for the Use of Natural Resources in 2016

Payment type	Amount (Rubles)
Land use (leases)	35,029,208.38
Subsoil use fees	2,472.00
Tax on extraction of common minerals	0.00
Water tax	61,616.00
Water use fees	111,809.03
TOTAL	35,205,105.41

3 KEY ENVIRONMENTAL PROTECTION AND ENVIRONMENTAL MONITORING PROGRAMS

3.1 PIPELINE RIGHT-OF-WAY REPAIR AND MAINTENANCE

In 2016 repair and maintenance activities were performed on the following Sakhalin-1 pipelines: Odoptu NWS – Chayvo OPF Flowline, Chayvo-Boatasino Gas Export Pipeline, Chayvo OPF – De-Kastri OET Oil Export Pipeline, Orlan Platform – Chayvo OPF Flowline, and Chayvo OPF – Berkut Platform Water Injection Flowline. These operations involved:

- Eliminating soil erosion sites and constructing engineered protective structures;
- Remediating the natural vegetative cover;
- Cutting trees and shrubs;
- Restoring the shoreline, eliminating subsidence and scouring, building structures for protection 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-way.

Regular visual inspections and aerial monitoring were conducted throughout the year in both insular and mainland areas to: assess the technical condition of the route corridor, assess the effectiveness of engineered protective structures, and identify any adverse exogenous processes in a timely manner. The following operations were completed:

Odoptu WS – Chayvo OPF flowline

The second phase of the operations was completed on both shores at the flowline crossing of the Nutovo River to eliminate the subsided water-filled pockets over the flowline in the marshy high-water bed. Crushed stone was placed in these subsidence-affected areas over the pipeline and to build bank protection structures near the river channel.

Activities to fill subsided water-filled pockets over the flowline in the marshy flood plain were conducted on both shores at the flowline crossing over the Maly Goromay river. Stone fill of 150-300 mm stones was dumped and installed at the river channel.

Orlan platform - Chayvo OPF flowline

Activities to reinforce and increase the layer of pipeline backfill by installing gabion mattresses and to backfill washout cavities along the flowline route were completed in the flowline area. The work was performed in winter.

Chayvo OPF – Berkut platform water injection flowline

Erosion remediation activities were completed within the flowline ROW. The activities included grading of the erosion site and stabilizing of the erosion site with geogrid and crushed stone.

Chayvo OPF – Boatasino gas export pipeline

Tree and shrub cutting was conducted; the work will continue during the summer of 2017.

Replacement of signs (aeronautical, information, road signs at crossings) installed along the route of the export pipeline was completed.

Chayvo OPF – De-Kastri OET oil export pipeline

Activities were completed to replace signs (air navigation, information, and road signs at pipeline crossings) within the oil pipeline ROW.

Technical and biological remediation of vegetation was performed. The work included elimination of soil erosion at 16 sites. Grass mix seeding was performed in all areas.

Activities to remedy gully erosion were completed on the western slope of the Unia-Tana River and on the western slope of Barkhatny Creek. Reinforcement and stabilization of slopes was accomplished by the installation of gabion structures and geogrid using crushed stone as filling material. Drainage of surface water was also provided.

Cutting of trees and shrubs was conducted throughout the entire area.

3.2 ENVIRONMENTAL MONITORING AND IN-PROCESS OVERSIGHT IN 2016

The environmental and in-process compliance monitoring implemented in 2016 at ENL construction and operating sites included the types of operations listed below.

Monitoring of stationary air emission sources at:

- Chayvo Onshore Processing Facility (Chayvo OPF)
- Chayvo Well Site (Chayvo WS)
- De-Kastri Oil Export Terminal (De-Kastri OET)
- Orlan Offshore Platform (Orlan OP)
- Berkut Fixed Offshore Platform (Berkut FOP)
- Odoptu Well Site 2 (North) (Odoptu NWS)
- Olympia residential complex
- Grounds of ENL head office in Yuzhno-Sakhalinsk

Air quality monitoring at:

- Chayvo WS
- Chayvo OPF
- De-Kastri OET
- Odoptu Well Site 2 (North) (Odoptu NWS)
- Orlan OP
- Grounds of ENL head office in Yuzhno-Sakhalinsk
- Olympia residential complex
- Chayvo OPF Temporary Waste Storage Area (TWSA)
- De-Kastri OET TWSA
- De-Kastri OET industrial and domestic waste landfill
- Odoptu Well Site 2 (North) (Odoptu NWS) TWSA

Potable water quality monitoring at:

- Chayvo OPF
- Chayvo WS

- Orlan OP
- Berkut FOP
- De-Kastri OET
- Odoptu Well Site 2 (North) (Odoptu NWS)
- Olympia residential complex
- ENL head office

Domestic wastewater quality monitoring at:

- Chayvo OPF
- Chayvo WS
- Orlan OP
- Berkut FOP
- De-Kastri OET
- Olympia residential complex
- ENL head office
- Odoptu Well Site 2 (North) (Odoptu NWS)

Monitoring of wastewater/produced water quality for injection at:

- Chayvo OPF
- Orlan OP

Groundwater level and quality monitoring at:

- Chayvo WS
- Chayvo OPF
- De-Kastri OET
- Odoptu Well Site 2 (North) (Odoptu NWS)

Groundwater level monitoring:

Along the Chayvo OPF – Cape Uangi (Sakhalin Oblast) and Cape Kamenny – De-Kastri OET (Khabarovsk Krai) oil export pipeline routes.

Surface water stream hydrology and morphology monitoring at:

- At water stream crossings of the Chayvo OPF – Cape Uangi (Sakhalin Oblast) and Cape Kamenny – De-Kastri OET (Khabarovsk Krai) oil export pipeline routes
- At water stream crossings of the Odoptu Well Site 2 (North) (Odoptu NWS) -Chayvo OPF flowline route;
- Unnamed creek (near Chayvo OPF)

Seawater quality monitoring in:

- Chikhachev Bay, near the single point mooring (SPM)
- 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 vessel berthing sites at the TOF, and near Cape Agivo during the implementation of the "*Sakhalin-1 Project. Odoptu Onshore Facilities.* Odoptu Well Site 2 (North) *Expansion. Temporary Offloading Facility (TOF)"* project
- Sea of Okhotsk, near the area of treated water discharge from combined outlet No. 1 of the Berkut fixed offshore platform
- Sea of Okhotsk, near the site of suspended wells Dagi 7-2 and Dagi-15

Monitoring of water protection zones in:

- Chikhachev Bay, at the De-Kastri OET site
- Piltun Bay, near the Odoptu Onshore Facilities TOF

Monitoring of marine biota and bottom sediments in:

- Piltun Bay, along the underwater flowline crossing route

Monitoring of vegetation communities at:

- Odoptu Well Site 2 (North) (NWS)
- Odoptu Well Side 2, South (SWS)
- ROW for flowlines and utilities (FL/UC) construction.

Topsoil monitoring at:

- Chayvo OPF TWSA
- De-Kastri OET TWSA
- De-Kastri OET industrial and domestic waste landfill
- TWSA
- Odoptu Well Site 2 (North) (NWS) TWSA
- Odoptu Well Side 2, South (SWS)
- FL/UC construction site
- Olympia residential complex

Geotechnical monitoring:

- Along the Chayvo OPF – Cape Uangi (Sakhalin Oblast) and Cape Kamenny – De-Kastri OET (Khabarovsk Krai) oil export pipeline routes
- Along the Odoptu Well Site 2 (North) (NWS) – Chayvo OPF flowline route
- Along the Chayvo OPF – Boatasino gas export pipeline route
- Along the Chayvo OPF – Orlan platform gas reinjection flowline route
- Along the full wellstream flowline route from the Orlan platform wells
- In the pipeline landfall area near Chayvo WS
- Chayvo OPF
- Chayvo WS
- De-Kastri OET
- Odoptu Well Site 2 (North) (NWS)
- Odoptu Well Side 2, South (SWS)
- FL/UC construction site
- Shoreline lithodynamics near Odoptu NWS
- In the pipeline landfall area associated with the Odoptu Well Site 2 (North) (NWS) – Chayvo OPF underwater flowline crossing of Piltun Bay
- In the Odoptu Onshore Facilities TOF construction area

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

- Orlan OP
- Berkut FOP
- Chayvo OPF
- Chayvo WS
- De-Kastri OET
- Odoptu Well Site 2 (North) (NWS)
- ENL head office
- Olympia residential complex

3.3 ENVIRONMENTAL MONITORING AND IN-PROCESS OVERSIGHT RESULTS IN 2016

Monitoring of stationary air emission sources

In most cases, the stationary source air emission monitoring at all Sakhalin-1 Project facilities, residential area, and Company office did not indicate any exceedance of maximum permissible emission standards with respect to the parameters being studied; 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 did not exceed the standard requirements for residential and workplace air quality at all Sakhalin-1 Project industrial facilities, temporary waste storage sites, and industrial and domestic waste landfill.

Potable water quality monitoring

Water samples taken at all Sakhalin-1 industrial facilities, residential area and Company office for all parameters during the monitoring period conformed to the regulatory requirements 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 for Water Quality in Centralized Potable Water Supply Systems. Quality Control».

Monitoring of domestic wastewater quality

The analyses of wastewater samples taken at all Sakhalin-1 Project industrial facilities, residential area, and Company office at the intakes and outlets of biological treatment facilities indicated that the treatment efficiency in terms of the parameters subject to regulation conformed to the treatment facility specifications.

Monitoring of injected wastewater quality

The produced water treatment system at Chayvo OPF is intended to remove oil from the water. After the treatment cycles, the water is pumped into a wash drum to remove light hydrocarbons and then injected into a disposal well while all injection parameters are continuously monitored.

On the Orlan platform, domestic wastewater is passed through an electrodissociative treatment system in the wastewater treatment plant and is then pumped from the storage tank into a disposal well. No wastewater is discharged into the sea.

Monitoring of groundwater level and quality

Chayvo WS and Chayvo OPF

The results indicate that natural factors play the primary role in determining groundwater levels at ENL's industrial sites. The fluctuations in groundwater levels throughout the observation period did not exceed natural seasonal variations in the Chayvo OPF area. No manmade disturbances in the groundwater regime (or associated changes in groundwater table depths) were observed.

Groundwater quality analysis results remained stable by comparison with previous years of monitoring.

De-Kastri OET

Static groundwater levels on the grounds of the terminal are located at depths of 8 m or more below ground level, i.e. groundwater does not come into contact with OET facilities. No manmade disturbances in the groundwater regime (or associated changes in groundwater table depths) were observed.

Overall, groundwater quality remained stable over the entire monitoring period.

Odoptu Well Site 2 (North)

The fluctuations in groundwater levels in observation wells are minor and seasonal in nature.

Groundwater quality results generally remain stable.

Borrow pits near Odoptu SWS

Water samples from the waterlogged excavations at borrow pit 2 were taken to check for the presence of petroleum products.

Laboratory analyses indicate that the environmental protection measures taken during operations have been effective.

Monitoring of groundwater level

Chayvo OPF – Cape Uangi (Sakhalin Oblast) and Cape Kamenny – De-Kastri OET (Khabarovsk Krai) oil export pipelines

Comparison of hydrogeological monitoring data for 2012–2016 showed that the fluctuations in groundwater levels in wells drilled at the watershed areas or the tops of slopes of river valleys with a substantial water table depth are consistent with the natural long-term average intra-annual variations. For wells in stream flood areas, as well as in areas where the water table is shallow (depth less than 5.0 m), fluctuations in levels range from 0.30 to 0.55 m, which also is fully consistent with natural long-term average annual variations.

The 2016 results generally fit within the general set of hydrogeological parameters for the pipeline route. No anomalous deviations in levels were recorded in any of the boreholes, which indicates that the hydrogeological setting along the route corridors remained stable.

Surface stream hydrology and morphology monitoring

Chayvo OPF – Cape Uangi oil export pipeline

The 2016 hydrology and morphology monitoring was conducted during the summer low-water period. At the end of snow melting, water levels of the rivers along the oil export pipeline route in the central and western parts of Sakhalin Island were higher than on the east coast and close to the average for this phase of the hydrological regime. There are several reasons:

heavier snow cover in the mountainous central and windward western parts of the island, and a more prolonged drawdown of winter moisture reserves;

decreasing seepage losses due to the presence of shallow, rocky watertight strata, and lowering of the water table (noticeable from drying up of bogs) and increasing seepage losses on the sand flats of the east coast in the context of a multi-year low-water period.

Low spring floods and prolonged low-water periods in the absence of high floods during the summer-fall period have been observed for several years in a row. Under such conditions, little development of channel deformations is observed in rivers and creeks, the channels (including crossing sites) are stabilizing, and the banks and flood plains are heavily overgrown with vegetation.

Rubble fill on the bank slopes and the bottomland from the crossing construction phase largely supports the good condition of the riverbank belt. This approach enabled us to prevent directional erosion during flood water runoff.

Comparison of transverse profiles measured on fixed section lines over a period of many years indicates very little deformation of stream beds at the crossing sites and preservation of their general features established during channel stabilization in the post-construction period. The anticipated deformation rates in the context of poor entrenchment of stream beds generally are significantly reduced for low-water periods. There are very few areas of fresh block subsidence on steep slopes; also, previously subsided (displaced) blocks of soil at the bank baseline are overgrown rather than eroded.

The channel processes pose no immediate risk to safe operation of the oil pipeline or fiber-optic communication line (FOCL) cable at any of the crossings.

Cape Kamenny – De-Kastri OET oil export pipeline

The 2016 hydrology and morphology monitoring was conducted during the summer low-water period. The weather during the pre-monitoring period was warm and dry with little precipitation. The winter of 2015–2016 produced little snow and had thaw periods, which resulted in minor snow accumulations, rapid melting of the snow cover and, consequently, low spring floods and generally low levels of water in rivers throughout the year of 2016.

As the results of hydrological monitoring indicated, the main hydrological characteristics (flow rate, velocity, flow width) were the lowest for any observation period in all the streams surveyed.

The general condition of crossings has not changed significantly compared to 2015, which was mainly due to the good overgrowth of the bank slopes within the ROW and bank protection measures implemented as long ago as the construction period (bank slope flattening and reinforcement of the ROW surface with crushed stone). The channel processes (both bottom and side erosion) within the ROW decelerated in most streams and currently pose no significant risk to safe operation of the oil pipeline.

Odoptu Well Site 2 (North) – Chayvo OPF pipeline

The 2016 hydrological and morphological monitoring was conducted during the persistent summer low-water period. The weather during the pre-monitoring period was relatively dry and warm. By the commencement of monitoring, the snow cover was completely melted over the entire stretch of the *Odoptu Well Site 2 (North)* – Chayvo OPF pipeline route. The spring period of 2016 was characterized by low-level flooding, hence none of the crossings were exposed to extreme rises of water levels.

At all crossings over water bodies, the areas disturbed by human activity are continuing to blend into the natural stream system. This process occurs primarily through extensive overgrowth of the bank belt and bank slopes with hydrophilous grass and bushes (sedge, horsetail, willow). Stabilization of the situation to a great extent is also the result of the additional bank protection work completed so far to prevent water from leaving the main river channel into bottomland by way of depressions above the pipeline trench.

All crossings of stream channels within the corridor (including the sections immediately above the pipeline and FOCL cable trench) are stable, and there are no traces of active stream bed deformation (side or bottom erosion) at any of the crossings. Comparison of transverse profiles measured on fixed section lines for different years indicates very little deformation of stream beds at the crossing sites and preservation of their general features established during channel stabilization in the post-construction period.

The riverbank protection belts and water protection zones at all the water crossings are in good, stable condition. There was no evidence indicating the formation of bottomland streams leading to erosion of the corridor surface at any of the crossings. Route markers remain in place, and the condition is good.

Unnamed Creek (near Chayvo OPF)

Monitoring was conducted during the ice-free period, from June to October 2016. Current speed and creek depth were measured. The hydrological characteristics of the Unnamed Creek are typical of creeks of northern Sakhalin.

Monitoring of seawater quality

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

During the reporting period, sampling was performed before and during the discharges. The laboratory test results confirm that the wastewater discharges had no effect on seawater composition and properties in the study area.

Chikhachev Bay. Single Point Mooring (SPM) area

The surveyed portion of the Bay area is exposed to relatively heavy shipping traffic, as well as to the potential impact from the port of De-Kastri; consequently, the seawater samples occasionally exhibit petroleum product concentrations exceeding MPC levels.

However, no correlation between the instances of excessive petroleum product, suspended solids, and copper content in the water and the tanker loading operations was found.

Piltun Bay. Temporary Offloading Facility (TOF) area

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

The laboratory analyses performed in July of 2016 during the barge offloading for hydrochemical parameters revealed no excessive levels. The content of suspended solids and total petroleum hydrocarbons at all sampling points was significantly lower than the background characteristics.

Piltun Bay near vessel mooring site at Cape Agivo

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

Piltun Bay near vessel mooring site at Temporary Offloading Facility

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

The laboratory analyses performed in September of 2016 for hydrochemical parameters revealed no excessive levels. The content of suspended solids and total petroleum hydrocarbons at all sampling points was significantly lower than the background characteristics.

Sea of Okhotsk in the vicinity of treated water discharge from combined outlet No. 1 of Berkut platform

Seawater sampling to determine the effect of discharges of mixed wastewater was conducted at three points within a radius of 250 meters around Berkut platform.

Seawater pollutant content did not exceed the maximum permissible concentrations for fishery water bodies in accordance with Order No. 20 of January 18, 2010, *Approval of Fishery Water Quality Standards, Including Maximum Permissible Concentrations of Harmful Substances in Fishery Water Bodies*. No effect of wastewater discharges was found.

Sea of Okhotsk in the vicinity of suspended wells Dagi 7-2 and Dagi 15

The studies were a continuation of the annual environmental monitoring, and were conducted to assess the environmental conditions in the vicinity of suspended wells in accordance with the Dagi 7-2 and Dagi-15 Suspended Wells Monitoring Program in the northeastern shelf waters of Sakhalin Island in 2012-2020.

Visual monitoring in the area failed to detect any contamination of the water by petroleum products. The petroleum hydrocarbon content of the seawater samples analyzed did not exceed the MPCs prescribed by Order No. 20 of January 18, 2010, *Approval of Fishery Water Quality Standards*.

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 within the study areas.

Piltun Bay. Temporary Offloading Facility (TOF) area

The 2016 monitoring failed to identify any visible erosion processes within the water protection zone of the facility.

Monitoring of marine biota and bottom sediments

Piltun Bay

Samples in July 2016 contained 28 species of benthic hydrobionts: 5 species were water plants and 23 species were benthic invertebrates. In regard to numbers of species, as in previous years, crustaceans accounted for the greatest total number of species (six), followed by dipterous larvae (five), bivalve mollusks (four), and polychaete worms (three).

Density was made up primarily of bivalves, gastropods and polychaete worms. The bulk of biomass, in general, consisted of bivalve mollusks and flowering plants, and bivalve mollusks only among zoobenthos.

Due to the variety of habitat conditions, several benthic macrozoobenthos communities exist in the survey area.

The communities in the shallows were characterized by both low density and low biomass. Large bivalve mollusks reside in deeper waters, where environmental conditions are relatively constant, which gave rise to high benthos biomass in the primary communities.

Regardless of association with any particular layer, the species abundance index in the primary communities was higher for number density than for biomass. Also, most of the communities that are present are monodominant, which indicates that the situation is more stable than in 2015. The lists of significant species were practically unchanged in 2014-2016.

The microphytobenthos species composition in Piltun in 2016 was practically the same as in previous years. The numbers of species in the samples in different years ranged from five to seven and depended primarily on the time period during which the samples were collected and on the environmental conditions, such as water clarity and temperature. *Zostera japonica*, *Zostera marina* and *Ruppia occidentalis* account for the bulk of the undersea vegetation in Piltun Bay. The total phytomass of undersea vegetation on the pipeline route increased somewhat compared to the previous year and averaged 312.8 g/m^2 (293.6 g/m^2 in 2015).

Monitoring plant communities

Odoptu Well Site 2 (North)

The fifth stage of vegetation monitoring at Odoptu Well Site-2 (North) was conducted in August 2016 to assess the status of flora and its response to human impact. Surveys were performed in eight permanent sampling areas which are representative of the most widespread and dominant types of vegetation in the region.

The analysis of the data collected by the survey of the vegetation showed that the plants were, in general, in normal viable condition.

No rare plant species listed in the Red Books of Russia (2008) or Sakhalin Oblast (2005) were found in any of the monitoring sample areas.

Odoptu Well Site 2 (South)

Sampling sites in the Odoptu Well Site 2 (South) area were set up in August 2016 to assess the status of flora and its response to human impact.

The sampling areas were located all around Odoptu Well Site 2 (South) and at various distances from it. A total of eight sampling areas were established.

Vegetation in the area is made up primarily of Siberian dwarf pine brush.

Vegetation communities in which supralittoral halophytic species are dominant or present grow on the coastal marine sand bars and terraces in the form of narrow bands and strips. Marsh vegetation with numerous variations and combinations develops in low-lying areas and along the shores of inlets and lakes.

No rare plant species listed in the Red Books of Sakhalin Oblast (2005) or the Russian Federation (2008) were found at the monitoring sampling sites or in contiguous areas.

No traces of pollution were found, and the vegetation bore no visible signs of human impact.

Flowlines and utilities area

Monitoring of vegetation was conducted in August 2016 in the established sampling areas to determine the condition of the vegetation and its response to human impact.

12-19 plant species were identified at different sites. During the past period there have been no particular changes in their range or structure.

No rare plant species listed in the Red Books were found.

No traces of pollution were found, and the vegetation bore no visible signs of human impact.

Soil cover pollution monitoring

Soil samples were taken at the ENL facilities in 2016 to evaluate the soil condition for the purposes of protection of human health and the environment.

No contamination of the soil by chemicals content which exceeds regulatory standards was found.

In terms of microbiological parameters, all samples comply with the hygienic standards.

No entomological and parasitological pollution was found in the samples, since no eggs, larvae, cysts of enteric protozoa, or pupae of synanthropic flies were found in the soil.

The soil is classified as “clean” and meets the sanitary and epidemiological requirements for the soil quality.

Geotechnical monitoring

Chayvo OPF – Cape Uangi oil export pipeline

A full walking inspection was performed in June and July 2016; the monitoring results yielded the following conclusions.

The area of sites of active occurrence or intensification of geotechnical processes continues to decrease over practically the entire route of the oil export pipeline. The following factors contribute to this process:

ongoing growth of grass and shrub vegetation within the route corridor;

engineering, technical and biological protection activities repeated every year;

the grass cover area exceeds 70–80% over a significant part of the route and reaches 100% in the corridor areas that lie within the waterlogged and marshy valleys of small watercourses.

Based on the 2016 observations, the picture of exogenous processes identified along the export oil pipeline route has changed in comparison with the previous periods. For example, the number

of areas of flooding / waterlogging initiated by human activity has declined substantially, and landslide areas along the route do not pose a risk to its safe operation.

Most of the *suffosion sinkholes* found in last year's inspection were remediated in the course of the work performed in the route corridor during the fall season of 2015. The condition of the reinforced sinkholes is good, and no recurring erosion or fine soil loss was recorded.

Areas of *flooding* found during previous monitoring stages have persisted, and overgrowth of the corridor surface with hydrophilic grassy vegetation continues in most such areas. The situation within these areas is stable, with no signs of deterioration. The covered drains installed in crossings through swampy areas to drain water across the route corridor are operating satisfactorily, and no increase in the area of patches of open water has been recorded.

The situation of absolute stability is observed at points where the corridor crosses areas at *risk for landslides* since the comprehensive work performed in 2012 for engineering protection of the route corridor.

Most *landslide-prone* areas are located in places where the corridor runs across hillsides where flattening of the slopes has been performed.

Cape Kamenny – De-Kastri OET export pipeline section

Monitoring of the route corridor was conducted in July and August 2016. The monitoring results yielded the following conclusions:

The route corridor surface is overgrown with grassy vegetation. The level of projective cover (grass, shrubs, trees) over practically the entire route is 90–100% of the area. In some parts, scrub fir and larch are the predominant vegetation. Trees and shrubs were cleared in compliance with the Route Maintenance Rules concurrently with the monitoring activities.

Practically complete restoration of the vegetation cover on the surface of the corridor promotes substantial intensification of evapotranspiration (i.e., absorption of surface moisture from the aeration zone by vegetation) and, consequently, a decrease in water content and an overall increase in the resistance of the route corridor to erosion processes.

The development of *slope processes* is restrained by both erosion control weirs and dense grassy vegetation that has been completely restored within the route corridor surface.

Gravitational type processes (caving, mud flows), confined to steep portions of slopes, including areas where slopes were undercut, occur on a very limited scale. No traces of intensification of the process since last year's survey were found.

Small gully erosion and linear erosion. The process has practically been stabilized due to the restoration of vegetation within the corridor surface. No fresh erosion forms have been discovered in the corridor.

Odoptu Well Site 2 (North) – Chayvo OPF pipeline

Monitoring of the route corridor of the Odoptu Well Site 2 (North)– Chayvo OPF flowline was conducted in June and July 2016. The monitoring results yielded the following conclusions:

Vegetation growth over the corridor surface continues. The projective cover area along most of the route ranges from 60% to 70% and increases to 100% in swampy stream valleys and runoff gullies. Grassy vegetation plays the main role in the vegetation composition. On the other hand, there is active growth of brush in some areas, and the brush projective coverage area has increased compared to 2015.

The restoration of the vegetation cover promotes substantial intensification of total evaporation and, consequently, a decrease in water content, which is exhibited most clearly in the pipeline route sections in waterlogged stream valleys. The decrease in open water windows and gradual blending of the corridor surface into the existing ecosystem continue.

One of the main factors in normalization of the situation at crossings of swampy stream valleys is restoration of the terrain and, consequently, of normal conditions for surface water runoff across the route corridor. Due to effective technical recultivation, no areas of flooding due to human activity have formed in any of the pipeline route sections over waterlogged floodplains / terraces or upstream marsh areas.

Areas are found where *water erosion* occurs within the route corridor, which exhibits primarily in the formation of linear gullies in the route corridor. Actions taken to contain the pockets of erosion development up to this point have minimized the risk of development of major gully erosion to a considerable extent. At present, the main erosion manifestations have a local nature.

Flooded / waterlogged areas are observed along the flowline route at crossings of the valleys of all rivers and most streams, as well as in pipeline route sections in the marsh tract. The process has a natural origin in most cases; no areas of intensification of waterlogging / flooding due to human activity were recorded.

Chayvo OPF – Boatasino gas export pipeline

Monitoring of *exogenous processes* along the gas pipeline route in the Chayvo OPF – Boatasino section determined the following:

The overall condition of practically the entire route corridor at the time of the survey in June 2016 can be assessed as good and stable.

The area of projective grass cover is 70 – 80%. The vegetation has been restored completely in stream valleys. Alder growth can reach 50% in some areas.

No major cases of intense erosion scouring were recorded within the gas pipeline route.

Areas of waterflooding development, associated with the flat saucer-shaped runoff troughs and stream valleys are in a stable condition: the corridor surface is completely covered with hydrophilous vegetation everywhere; no man-made disturbances of the surface water runoffs and no initiation of man-induced flooding were found.

There was *formation of mud flow and microlandslide processes* within certain slopes along the southern and western borders of the corridor. An engineering protection project was developed for such areas.

No traces of intensification of exogenous processes affecting the safety of the use of the route (frost heaving, pipeline buoyancy) were recorded.

Chayvo field flowlines:
Chayvo OPF - Orlan platform gas reinjection pipeline
Orlan platform – Chayvo OPF full wellstream pipeline

The extent of grassy vegetation growth in the route corridors is generally consistent with the monitoring data from 2015. Young alder brushwood not observed previously was found in individual parts of the route. The minimum of surface growth was found in areas of deflation and wind redeposition.

The extent of the grass cover area within the route corridors is 80 – 100%. Practically complete restoration of the vegetation cover promotes substantial intensification of evapotranspiration (i.e., absorption of surface moisture from the aeration zone by vegetation) and, consequently, a decrease in water content and an overall increase in the resistance of the route corridor to erosion processes;

The environmental status of flooded land areas is assessed as satisfactory and sufficiently stable. No changes in the surface area of flooded land along the routes compared to 2015 study data were found.

Suffosion processes found between the pipeline route corridors pose no threat to safe pipeline operation.

The development of *eolian processes and associated deflation* is found in the areas near the Chayvo WS and Chayvo OPF which have been altered by human activity.

The deflation processes have little potential for further development and do not pose a threat to safe pipeline operation.

Arkutun-Dagi field flowlines:
Chayvo OPF – Berkut platform produced water reinjection pipeline
Berkut platform – Chayvo WS full wellstream pipeline

The extent of grassy vegetation growth in the route corridors is generally consistent with the monitoring data from 2015.

No changes in the surface area of *flooded areas* along the route compared to 2015 study data were found.

Small gully erosion and linear erosion. The process has a very minor degree of development. There has been no significant intensification of the process compared to 2015 monitoring data. The restoration of vegetation within the corridor surface is helping reduce the surface area susceptible to erosion.

Chayvo OPF site

Erosion processes are the most common exogenous geological processes in the Chayvo OPF area.

Signs of *eolian processes* were found within the OPF site, except the central part of the non-industrial zone.

Both deflation processes (deflation basins) and accumulation processes are observed at the site.

Waterlogging under natural conditions within the Chayvo OPF site is limited to small areas found in the north, northwest and northeast sections of the site.

Flooding of the area occurs when the snow melts and during torrential rains.

Freeze-thaw processes at the Chayvo OPF site are manifested in the form of frost heave uplifting of individual fencing supports in upland boggy areas along the north boundary of the site.

Long-term monitoring in those areas shows that recorded frost heave (0.2 – 0.6 m) has been stable throughout practically all the monitoring stages. The process does not pose a risk to safe operation of the facility and does not require any technical recultivation or engineering protection.

Chayvo WS site

Erosion processes at Chayvo WS occur in site slopes, road slopes, and slopes of drainage ditches.

Both deflation processes and accumulation processes are present at the site. There has been no intensification of the processes based on the 2016 monitoring data.

Flooding and waterlogging were found in the northwest, west, and southwest parts of Chayvo WS.

There has been no significant intensification of the waterlogging process compared to 2015 data.

De-Kastri OET site

Exogenous geological processes in the De-Kastri OET site are limited in scope. The areal extent of the processes has not changed since the last monitoring survey and amounts to not more than 1-3% of the area; the intensity of the exogenous processes is low.

Erosion and suffusion-subsidence processes occur on the surfaces of artificial terraces near the fences. The condition of these areas is quite stable compared with the 2015 monitoring data.

Odoptu Well Site 2 (North)

The development of *suffosion processes* was found in three areas; they do not affect the safe operation of the industrial facilities and structures.

Waterlogging was not found in the Odoptu Well Site 2 (North) industrial area. The process is present in the undisturbed area on Piltun Bay Spit and to the north of the main site, outside the industrial facility area.

No partial or complete flooding was recorded during monitoring.

Freeze-thaw processes such as frost heave of the soil, frost cracking, or subsidence of buildings and structures due to permafrost degradation were not recorded in the Odoptu Well Site 2 (North) industrial facility area.

These processes were found only within one location associated with the upland boggy area.

Temporary Offloading Facility area during implementation of the Sakhalin-1 Project. Odoptu Onshore Facilities

The 2016 monitoring objectives included assessment of exogenous geological processes at the site of the Temporary Offloading Facility (TOF) and the adjacent area during the TOF operation period.

No *erosion processes* were found during the monitoring survey.

Eolian processes (deflation and accumulation of sand deposits) were observed in the TOF infill slopes. The main processes are accumulative and accumulative-deflation forms due to wind transport of sand deposits.

Three areas of *suffosion processes* were found on both sides of the TOF site infill. The forms identified are at an initial degree of development and do not pose a risk to safe operation of the facility.

The only case of a mild *landslide process* was found in the south infill area. The process does not pose a risk to safe operation of the facility.

Freeze-thaw processes (frost cracking) are observed in the area bordering the TOF on the southeast and associated with the upland boggy area. These processes do not pose any risk to safe operation of the facility.

Parameters of the above-water beach and underwater shore slope

Visual and instrumental inspections showed that the position of the above-water beach near the TOF is within normal limits.

Profiling of the underwater slope revealed small changes in the seabed topography which primarily affected the part of the underwater slope near the water's edge. These changes are not significant and are due to natural sediment transport.

Condition of TOF slopes

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

This process discovered does not pose a risk to safe operation of the facility.

Condition of the area where the TOF meets the shore

A tacheometric survey found no signs of deformation of the TOF.

Odoptu Well Site 2 (South)

Eolian processes were found in the Odoptu Well Site 2 (South) area due to the natural features of the construction site (presence of deposits of eolian and alluvial-marine origin made up of fine and very fine dispersion-prone sand underneath a thin topsoil).

No *erosion processes* were found during the fall monitoring stage.

No pockets of secondary *waterlogging* processes were found at Odoptu Well Site 2 (South) during the fall stage of monitoring surveys. The only case of seasonal flooding immediately at Odoptu Well Site 2 (South) was found in the east part of the site, which was due to heavy rainfall just before monitoring was performed.

There are no signs of such *freeze-thaw processes* as frost heave, frost cracking, or subsidence of buildings or structures at the Odoptu Well Site 2 (South) .

Currently there are no pockets of active development of *exogenous geological processes* that pose a risk to safe operation of the facility.

Odoptu Well Site 2 (North) – Chayvo OPF underwater pipeline crossing of Piltun Bay

Geotechnical processes were monitored in July of 2016 to assess the changes in the shore and the underwater slope in the pipeline landfall area.

The 2016 geotechnical monitoring showed:

There had been no substantial changes in the position of the shore slope near the pipeline landfall during 2015-2016 on the east and west shores of the bay. Insignificant changes that had taken place are due to natural erosion processes occurring under the influence of metocean factors.

Changes in the seabed topography within a one meter range of the east and west channels took place as compared to the 2015 monitoring results. Changes in the east channel depths were most

likely due to higher current speeds, which altered the seabed topography. The seabed deepened in the western area, probably due to erosion and sand drift.

Geotechnical monitoring of the pipeline landfalls near Chayvo WS

Geotechnical processes near the pipeline landfalls were monitored to assess the changes in the shore and the underwater slope in the land-sea transition area.

A comparative analysis of geotechnical monitoring results for 2012 through 2016 was performed based on the 2016 field data and the results for the five-year period.

A stable position of the beach terrace edge was recorded during the period of 2012 – 2016 on practically all the survey lines except one area, where the edge position shifted shoreward.

There were minor variations, both upward and downward within a range of 1-1.5 m, in the beach terrace edge height (since 2012). Changes in the edge height by such amounts are due to eolian transport of sand caused by wind.

There were changes in the terrace base elevation during the monitoring period: mainly an increase from 0.65 to 1.63 m.

There is a decrease in beach width in the monitoring area due to a change in underwater topography and an increase in the beach slope.

Monitoring from 2012 through 2016 showed that beach width, terrace edge height, and terrace base elevation underwent seasonal variations and deformations due to reshaping of the sedimentary materials by wind, storm surf, and tides. In addition, topographic changes in the underwater slope had a corresponding effect on the beach width and slope.

Shore reinforcement work in the Chayvo WS area is planned by ENL for 2019.

Lithodynamics of the Odoptu Well Site 2 (North) shore zone

The 2011 and 2016 surveys yielded the conclusion that the coastal area in question is a very active zone in which a combination of meteorological, hydrological, and lithodynamic factors has a distinct effect on the underwater and abovewater shore slope. This effect is manifested in changes in all the parameters monitored.

The survey results show that the shore terrace is retreating. The beach width and slope and the cliff base elevation change in an uneven manner throughout the study area, but the changes in individual areas are quite substantial.

The 2016 surveys found a washout at separate areas of the coastal terrace.

The underwater shore slope also underwent significant changes during the five-year period. Storm activity and the activity of reversing tidal currents along the shore created (deposited) an underwater ridge (bar) along the shoreline. A pronounced gully was formed along the shore, and the extent of the washout of sedimentary material in the gully during the five-year period reached 2-2.5 m in the south part of the study area. Hence one can conclude that reversing tidal currents along the shore make a substantial contribution to the formation of the underwater shore slope topography, which, in turn, affects the processes that occur in the abovewater part of the shore slope.

Shore reinforcement work in the Chayvo NWS area is planned by ENL for 2018.

Geodynamic (seismic and geo-deformation) monitoring

Field studies continued in 2016, and geo-deformation monitoring measurements were conducted at locations where the pipeline crosses the Central Sakhalin and Garomay faults.

Geo-deformation monitoring in the Garomay fault zone in 2006-2016 primarily traced unidirectional tectonic movements. Small 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.

There is a right-side shift at a slip rate of 1.5 mm/year in the Garomay fault zone. No significant vertical displacements were detected on either side of the fault.

Vertical deformations of the ground surface are larger than horizontal deformations in the vicinity of the pipeline crossing of the Garomay and Central Sakhalin faults. Potential coseismic shifts of the ground surface as a result of local and remote earthquakes are negligible and have no effect on the slip rates of the stations in the two geo-deformation monitoring grids.

Possible ground surface 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 January 1 through December 31, 2016, 408 seismic events with a magnitude $M_L \geq 1.0$, including 365 local earthquakes, were identified in the monitoring zone.

The spatial pattern of seismic activity distribution in the monitoring zone in the reporting period is generally similar to the data recorded during the previous reporting periods.

3.4 KEY ENVIRONMENTAL PROTECTION PROGRAMS

Western gray whale monitoring

In 2016 ENL, with the assistance of specialists from the National Science Center for Marine Biology of the Far East Branch of the Russian Academy of Sciences (DVO RAN), the Pacific Oceanology Institute 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.

The studies were conducted in accordance with the programs approved by the relevant Russian Federation agencies. Office processing and analysis of the extensive field data acquired in 2016 is underway at present.

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 waters off northeast Sakhalin Island from summer to fall. Benthos surveys show stable levels of food resources. The photo ID catalog contains 259 whales and is updated regularly.

The ENL Marine Mammal Protection Plan was updated and implemented successfully during the summer and fall offshore and nearshore operations. Not a single incident involving marine mammals was recorded in 2016.

Pinniped studies in Piltun Bay

In 2016 ENL, with the assistance of specialists from the Pacific Oceanology Institute of DVO RAN, conducted studies on pinnipeds at the mouth of Piltun Bay. The studies were aimed at assessing

the numbers and species compositions of pinnipeds in the area and determining their spatial-temporal dynamics.

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

Area of construction of the Temporary Offloading Facility (TOF) in Piltun Bay and the coastal area of the Sea of Okhotsk

Additional data on the abundance and distribution of ducks (as the main group that may be affected due to disturbance during the formation of migration congregations) in the bay waters near the TOF were obtained during the summer and fall of 2016.

The importance for migrating birds of the coastal zone of Piltun Bay in the area where ships pass by was assessed. Data were obtained on the abundance and distribution of sandpipers and gulls along the coastline. The significance of various parts of the coast and the adjacent sea area for migratory birds was assessed, including their abundance and distribution in the area from the Odoptu Well Site 2 (North) to the neck of the bay. Work continued to monitor the most important area in the construction zone, which includes Greater Wrangel Island (Wrangel Islands Natural Monument) and the adjacent marine bar area with its system of lakes.

The data obtained in 2016 confirm the conclusions of 2014 and 2015. The range of human disturbance impact during the work involved in operation of the TOF does not exceed a few tens 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 ducks larger than 1000 birds.

Key areas – the breeding grounds of bird species listed in the Red Book – remain outside the project impact zone. The closest major Aleutian tern colony is 2.5 km from the TOF.

Swans are maintaining the traditional travel routes and migration gathering locations, the largest of which are 4 km north of the 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.

The shipment of oversized loads by road from the TOF to Odoptu NWS does not disturb nesting birds and has no effect on nesting biotopes, since the loads are transported at very low speeds.

The passing of ships has no effect on the birds since it occurs during periods when there are no major gatherings of birds in the bay.

Section of the export pipeline in Khabarovsk Krai and the flowline section from the Odoptu Well Site 2 (North) to the Chayvo OPF

In the course of the 2016 studies, all areas along the flowline and export pipeline on Sakhalin Island and in Khabarovsk Krai scheduled for monitoring were inspected. The work was done during the nesting season and partly during the summer nomadic migration season.

Nesting groups of colonial nesting birds (black-headed gull and common tern) are preserved within monitoring area No. 1 (the Odoptu NWS area and km 1-7 of the flowline). There were 48 black-headed gull pairs and 178 common tern pairs that nested in the area in 2016. Ten rare bird species were recorded within the monitoring area, of which seven species nested in the survey area (Aleutian tern, Sakhalin dunlin, red-necked phalarope, long-toed stint, black-tailed godwit,

ruff, and falcated duck), one species (Steller's sea eagle) nested in other areas of the Piltun Bay shore, and two species (buff-backed heron and Bewick's swan) do not nest in Sakhalin Oblast.

The Aleutian tern and Sakhalin dunlin subspecies were the most numerous, as in previous years. The nesting density of the Aleutian tern within the monitoring area was higher than during the pre-construction period (51.5 pairs/km^2). The species on Greater Wrangel Island numbered 2,498 pairs. Analysis of the distribution of tern nests in relation to the pipeline route in different years failed to establish any effect from the pipeline on the numbers of nesting birds. Biotopes most heavily populated with terns throughout the monitoring period were located 300 to 700 m from the route. There has been a persistent upward trend in the Aleutian tern population in the survey area compared to the pre-construction period.

The condition of the nesting group of Sakhalin dunlin within monitoring area No. 1 is good. The total area of dunlin nesting habitats on the marine bar in the area adjacent to the pipeline route (1-7 km) in 2016 was estimated at 5 km^2, and the total size of the dunlin nesting group in the area was 147 pairs.

Four bird species listed in the Red Book were found in monitoring area No. 3 (flowline km 24-65): the white-tailed eagle, Steller's sea eagle, yellow-breasted bunting, and northern hawk owl. The yellow-breasted bunting and northern hawk owl nest within the area. The populations of these species are limited to a few pairs and are assessed as stable. The nesting and feeding areas of both species were preserved during the pipeline operation phase.

The status of the Siberian spruce grouse population in monitoring areas No. 8 and No. 9 (Khabarovsk Krai) remains stable. No effect of the pipeline on this nesting group during the operating period was found. The habitats of the Siberian spruce grouse which are used by the species in winter and the courtship areas in the immediate vicinity of the pipeline route were unchanged. The courtship area closest to the route was 30 meters from the pipeline swath. Traces of the presence of the Siberian spruce grouse were also found directly within the pipeline route.

3.5 COMPENSATION FOR DAMAGE TO AQUATIC BIOLOGICAL RESOURCES

In 2016 ENL continued its compensatory activities to make up for the damage to aquatic biological resources due to implementation of the Sakhalin-1 Project.

Sakhalin Oblast

ENL implemented compensatory measures for artificial reproduction of Pacific salmon to compensate the damage to aquatic biological resources in Sakhalin Oblast for the following projects:

Sakhalin-1 Project. Odoptu Onshore Facilities. Odoptu Well Site 2 (North) Expansion. Temporary Offloading Facility: 10,456,517 juvenile chum salmon valued at RUB 39,421,069.09;

Sakhalin-1 Project. Chayvo Field Development. Orlan Offshore Platform. *Batch Drilling of Wells O-14, O-41, and O-42* - 145,434 juvenile chum salmon valued at RUB 548,286.18;

Export pipeline: Trunk Pipeline (Onshore Section) from Chayvo OPF to Nevelskoy Strait (including pressure testing) - 3,074,286 juvenile chum salmon valued at RUB 4,980,343.32;

Export pipeline: Trunk Pipeline Sea Crossing of Nevelskoy Strait (underwater crossing, half of total length) - 11,235,429 juvenile chum salmon valued at RUB 18,201,394.98;

Onshore flowlines: Odoptu WS – Chayvo OPF and Chayvo WS – Chayvo OPF - 1,541,714 juvenile chum salmon valued at RUB 2,497,576.68;

Orlan Platform Construction and Operation - 6,048,000 juvenile chum salmon valued at RUB 9,797,760.00;

Odoptu Access Road - 991 juvenile chum salmon valued at RUB 3,736.07;

Riprap (Berm) Restoration in the Offshore Area of Pipeline-to-Orlan Platform Base Interface on the Northeast Shelf of Sakhalin Island in September-October 2014 - 8,951 juvenile chum salmon valued at RUB 33,745.27;

Riprap (Berm) Restoration in the Offshore Area of Pipeline-to-Orlan Platform Base Interface on the Northeast Shelf of Sakhalin Island in August-October 2015 - 11,103 juvenile chum salmon valued at RUB 41,858.31.

Therefore, in 2016, by way of compensation for damages under the Sakhalin-1 Project for Sakhalin Oblast, ENL released 32,522,425 juvenile chum salmon from the Ado-Tymovsk, Pobedinsk, and Buyuklovskiy salmon hatcheries for a total value of RUB 75,525,769.90.

Khabarovsk Krai

Measures to compensate for the harm or damage caused to aquatic biological resources and their habitats in the course of implementation of the *Sakhalin-1 Project Program for Integrated Offshore Engineering Surveys for Technical Substantiation of the Construction Site and Further Preparation of Design Documentation for Offshore Facilities in the Klykov Peninsula Area of Chikhachev Bay* were developed and approved in 2016.

To implement the above activities, ENL signed contracts with the Amur Territorial Administration of the Federal Agency for Fisheries and the Amur River Basin Office of Fishing and Conservation of Aquatic Bioresources (Amurrybvod) to provide services for the cultivation and release of juvenile chum salmon to compensate for damage to aquatic biological resources and their habitats as a result of commercial activity.

The measures developed and approved resulted in the release of 252 juvenile chum salmon valued at RUB 1,499.40 in 2016.

ENL SHE Performance Results 2014-2016

	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
Environmental Performance Component						
Marine vessel spills (long term leased). Number of oil and petroleum products spills	0	0	0	0	0	0
Other spills (not from marine vessels). Number of oil and petroleum products spills	53	53	36	36	30	30
Oil and Petroleum products spilled from Marine vessels	0	0	0	0	0	0
Other oil and petroleum products spills (kg/t produced HC)	0,000025	0,000020	0,000042	0,000033	0,000070	0,000040
Other oil and petroleum products spills (kg/t of fuel equivalent)	0,000018	0,000015	0,000029	0,000024	0,000048	0,000027
Specific accident rate on pipelines resulting in oil/condensate/product/formation water spills (cases / 1 km of pipelines)	0	0	0	0	0	0
Contaminated land area at year end to year beginning ratio (ha/ha)*****	0	0	0	0	0	0
Specific index of pollutants gross emissions (kg/t produced HC)	2,03	1,59	3,09	2,50	1,43	0,83
Specific index of pollutants gross emissions (kg/t of fuel equivalent)	1,42	1,18	2,16	1,75	1,00	0,55
Specific index of Sulfur Dioxide (SO2) emitted (kg/t produced HC)	0,023	0,018	0,018	0,014	0,014	0,0084
Specific index of Sulfur Dioxide (SO2) emitted (kg/t of fuel equivalent)	0,016	0,012	0,012	0,010	0,010	0,0055
Specific index of Nitrogen oxides (NO2) emitted (kg/t produced HC)	0,41	0,32	0,53	0,45	0,29	0,17
Specific index of Nitrogen oxides (NO2) emitted (kg/t of fuel equivalent)	0,29	0,22	0,37	0,30	0,20	0,11
Specific index of volatile organic compounds (VOC) emitted (kg/t produced HC)	0,68	0,53	0,59	0,48	0,45	0,26
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
Associated petroleum gas utilization level (%)	97,65%	97,65%	95,33%	95,33%	97,1%	97,1%
Greenhouse gas (Methane) emitted (kg/t produced HC)	0,018	0,014	0,076	0,062	0,029	0,017
Greenhouse gas (Methane) emitted (kg/t of fuel equivalent)	0,012	0,009	0,053	0,043	0,020	0,011
Specific water intake (м3/t produced HC)	1,18	0,92	1,72	1,38	1,45	0,85
Water intake (м3/t of fuel equivalent)	0,82	0,65	1,20	0,97	1,02	0,56
Contaminated waters disposal into surface water bodies (м3/t produced HC)	0	0	0	0	0	0
Contaminated waters disposal into surface water bodies (м3/t of fuel equivalent)	0	0	0	0	0	0
Total Wastes disposed, treated and buried (t) ******	126 800	126 800	197 300	197 300	135 198	135 198
Total wastes generated (t) ******	156 398	156 398	197 348	197 348	171 813	171 813
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
Expenditures on Environmental Safeguards (thousand RUB)	2 306,1	2 306,1	2 757,5	2 757,5	2 196,2	2 196,2
Emergencies with significant (high-profile public impact) socioeconomic damage	0	0	0	0	0	0

***** 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

****** 2016 indicators do not also include the amount of produced water, which was injected into special-purpose well on Chayvo OPF (Garomai license block)

*******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 and total waste generation (including the produced water amount) 99,7% in 2016. The combined amount of these two types of waste is excluded from review in order to keep the data representative.

ENL SHE Performance Results 2014-2016

	Safety and Health Components	2014	2015	2016
1	Lost-time incident rate – employees (per 200000 work hours)	0,26	0,00	0,00
2	Lost-time incident rate – contractors (per 200000 work hours)	0,00	0,05	0,00
3	Lost-time incident rate – total workforce (per 200000 work hours)	0,04	0,04	0,00
4	Total recordable incident rate – employees (per 200000 work hours)	0,52	0,18	0,00
5	Total recordable incident rate – contractors (per 200000 work hours)	0,20	0,14	0,03
6	Total recordable incident rate – total workforce (per 200000 work hours)	0,26	0,15	0,03
7	Fatalities - employees	0	0	0
8	Fatalities - contractors	0	0	0
9	Fatal accident rate – total workforce (per 1 000 000 work hours)	0,00	0,00	0,00