



**ENVIRONMENTAL MANAGEMENT AND
ENVIRONMENTAL PROTECTION POLICY**

**EXXON NEFTEGAS LIMITED
SAKHALIN-1 PROJECT OPERATOR**

An ExxonMobil Subsidiary

2015

“Energy makes life as we know it possible. Energy provides the fundamental underpinnings for quality of life. Energy powers the world’s economies and allows us to improve our standards of living.

ExxonMobil’s core mission is to power the world’s progress by expanding energy supplies safely, securely and responsibly. We believe our industry will be instrumental to meeting a fundamental and universal human need. Our successes are a reminder that new technologies and proven techniques are the key to unlocking abundant sources of energy. We uphold the highest standards of safety and environmental protection in supplying the world’s energy.”

Rex W. Tillerson

Chairman and CEO of Exxon Mobil Corporation

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1. INTRODUCTION

ExxonMobil is a world leader in the oil and gas and petrochemicals industries. Continually improving its financial and operating performance, ExxonMobil upholds the highest standards of business conduct.

ExxonMobil conducts its business while strictly following all applicable laws and regulations, respecting the local and national cultures, and placing top priority on industrial safety and environmental protection during its operations.

The company seeks to attain the highest level of competitiveness across all of its business streams while researching and embracing the latest achievements and developing its proprietary technologies.

The aim of this report is to provide information about the policy and key aspects of environmental performance of Exxon Neftegas Limited, an ExxonMobil subsidiary, as it develops oil and gas fields as part of the Sakhalin-1 Project, about the efforts to prevent and mitigate environmental impacts from this project, and about 2015 environmental performance indicators.

Information has been provided to the public throughout the entire project implementation period. The Sakhalin-1 Project website at www.sakhalin-1.ru publishes and regularly updates information about the project itself, job opportunities, contract awards, public engagement, safety, health, and environment.

Exxon Neftegas Limited (ENL) is a subsidiary of ExxonMobil, and ENL performance is reflected in ExxonMobil Corporate Citizenship Reports published in English at www.exxonmobil.com In preparing this report, excerpts from the 2015 ExxonMobil Corporate Citizenship Report were used, which has received an assurance statement from *Lloyd's Register Quality Assurance, Inc. (LRQA)* to the effect that ExxonMobil reports for 2015 conform to the requirements of the International Petroleum Industry Environmental Conservation Association (IPIECA) and the American Petroleum Institute (API).

2. OPERATIONS INTEGRITY MANAGEMENT SYSTEM

ExxonMobil remains steadfast in commitment to excellence in safety, security, health and environmental (SSH&E) performance, referred to collectively as “operations integrity”.

Operations integrity extends to all aspects of ExxonMobil business. The best way to manage the integrity of the Company’s business is through a capable, committed workforce coupled with policies, practices and management systems designed to enable safe, secure and environmentally responsible operations.

The Operations Integrity Management System (OIMS) is the cornerstone of ExxonMobil commitment to managing risk factors and achieving operational excellence.

OIMS establishes a common framework for addressing SSH&E risks. At the global corporate level, the OIMS framework is built around 11 elements, as illustrated below, each covering a key aspect of risk across the breadth of ExxonMobil’s operations. Each element is comprised of a number of expectations, 65 in all. These elements provide greater detail about OIMS implementation mechanisms.

OIMS element 1 — management leadership, commitment and accountability — outlines the expectations of managers as they lead their units through implementation of OIMS principles. OIMS element 11 — operations integrity assessment and improvement — describes the requirements associated with how each operating unit evaluates the extent to which it is meeting the expectations of OIMS. These two elements are often referred to as the “bookends” of OIMS, with element 1 being the “driver” and element 11 providing the feedback mechanism to ensure continuous improvement. Elements 2 through 10 address the operational, day-to-day aspects of OIMS, such as risk management, facilities design and construction, and personnel management and training.

All operating organizations are required to conform to the expectations described in OIMS. In order for the 11 elements and 65 expectations to be consistent and relevant across ExxonMobil’s diverse operational portfolio, our Upstream, Downstream and Chemical businesses have established detailed OIMS guidelines. These guidelines describe how each business unit addresses the 65 corporate expectations relevant to that business unit’s operations. Additionally, management is responsible for ensuring that management systems satisfying the requirements of the OIMS framework are in place at each operating unit.

OIMS includes a systematic, disciplined approach to measure progress and track accountability across business lines, facilities and projects. To drive continuous improvement, the Company evaluates opportunities to improve the OIMS framework by periodically reviewing and upgrading it.



Since the inception of OIMS in the early 1990s, ExxonMobil has significantly reduced lost-time incident rates, demonstrated a remarkable decline in marine spills and contributed to continuing emission reductions.

OIMS quantitative performance indicators are published in Corporate Citizenship Report 2015 and are available for publicity in Russian language in the internet site www.exxonmobil.ru.

ExxonMobil Corporation has been certified by Lloyd's Register Quality Assurance, Inc. (LRQA), confirming that the Operations Integrity Management System is compliant with the international standards ISO 14001 and OHSAS 18001. The conformity of ExxonMobil's 2015 Corporate Citizenship Report to the requirements of the International Petroleum Industry Environmental Conservation Association (IPIECA) and the American Petroleum Institute (API) was confirmed by LRQA in the Assurance Statement (ExxonMobil Corporate Citizenship Report, p.94)

ExxonMobil has been cited by Lloyd's Register Quality Assurance (LRQA) for "being among the leaders in the extent to which environmental management considerations have been integrated into our ongoing business practices."

The Operations Integrity Management System of ExxonMobil, the practices and rules developed for purposes of meeting its expectations are mandatory for all business units of Exxon Mobil Corporation and fully implemented in the company Exxon Neftegas Limited.

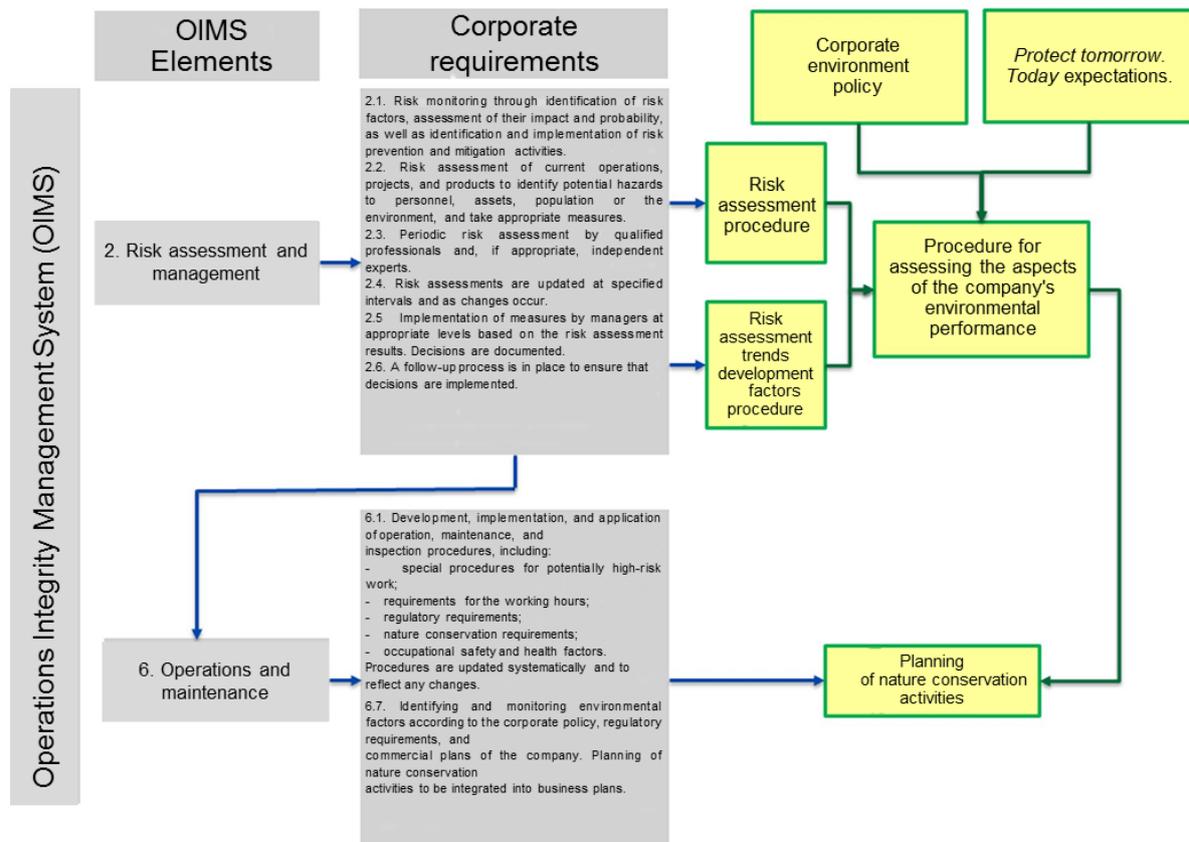
3. ENVIRONMENTAL MANAGEMENT

Environmental management is part of the overall OIMS. The environmental management system has a clear organizational structure and aims at achieving the provisions specified in the environmental policy by implementing environmental protection programs and activities.

ExxonMobil's projects and operations are set in a diverse range of climatic regions of the world that present a variety of environmental, social and health risks and opportunities. The Company employs structured management processes across an asset's life cycle to ensure effectively identification and understanding the actual and potential impacts of the activities on the environment and socioeconomic development of the region.

The *Environmental Aspects Assessment* (EAA) process allows the Company to systematically identify, assess, manage and monitor environmental and social risks throughout the life cycle of the assets.

Assessment of the environmental performance aspects of business operations is the principal OIMS mechanism for risk assessment and management as well as a key element of the process of planning the aspects of the Company's environmental performance as prescribed by OIMS. Illustrated below are the interconnections of the key corporate policy components, expectations, systems, and guidance documents with the processes of assessment of the environmental performance aspects of business operations and planning of nature conservation activities.



The Company periodically reassesses the background condition of the environment depending on the complexity of operations and any sensitive elements of the environment that may be present. Reassessment of the background condition is performed by a cross-disciplinary team comprised of professionals with appropriate knowledge and expertise in engineering research, operation, public relations, and environmental protection.

Assessment of the environmental performance aspects of the Company's operations involves studying alternative working hours, facility and pipeline route locations, or technologies. For existing facilities and ongoing operations, the results of identification and assessment of the environmental performance aspects serve as the primary guide to choosing the priorities in planning of operations and finding opportunities for improving environmental performance.

The Company's environmental performance planning process is implemented with a view to establishing nature conservation indicators, monitoring compliance and tracking changes. Plans of nature conservation, socioeconomic, and public health activities are developed and implemented throughout the development and production phases to minimize environmental and social risks. Reducing these risks down to an acceptable level or mitigating their impacts.

ExxonMobil integrates stakeholder feedback, the results of scientific research into the above processes to ensure we operate in a safe, environmentally-friendly, and socially responsible manner.

4. KEY ASPECTS OF ENVIRONMENTAL PERFORMANCE AND RESEARCH BY EXXONMOBIL

ExxonMobil's strategic environment principle *Protect Tomorrow. Today.* is the foundation of our activity and the benchmark target for achieving superior environmental performance. Under this principle, ExxonMobil strives to be a leader in maintaining viability and in development of ecosystem services that serve for people as sources of food, clean water, air, and cultural identity. In this context, the Company considers such factors as the rarity of individual species, their habitat conditions, their roles in existing ecosystems, their vulnerabilities and their cultural significance.

Protecting biodiversity

ExxonMobil plans the activities based on a scientific understanding of the biodiversity in the areas of operation. The company conducts research and supports initiatives to maintain biodiversity. In 2015, \$4 million were contributed to organizations focused on biodiversity protection and land conservation.

For many years, ExxonMobil sponsored research efforts to study the effects of noise on marine mammals. In 2015, Exxon Neftegas Limited conducted a seismic program covering three Sakhalin-1 offshore license areas. Throughout the design and implementation of the program, being protective of the western gray whale — species classified as critically endangered by the International Union for Conservation of Nature (IUCN) — was very important. The detailed monitoring and mitigation strategy is based on 17 years of research on these animals and their habitat, on the best practices developed and enhanced during previous seismic operations, and on the knowledge of the timing and behaviors of whales in the area of operations.

ExxonMobil manages elevated biodiversity or species risks by thoroughly examining the environmental context of the areas of the planned operations, as well as by developing and implementing adequate protective measures.

Water Management

ExxonMobil works to prevent adverse impacts to water resources from the withdrawals and discharges and prudently manages the water needed for the operations. For each area of operation ExxonMobil develops and implements water management strategies that take into consideration quality and availability, as well as potential negative impacts related to varied operational modes, increased energy use or the consequences of producing more concentrated waste streams.

In 2015, water consumption declined by 5 percent compared to 2007.

The Company recognizes that some operations require large volumes of water while being aware of the need to save water resources. In 2015, ExxonMobil collaborated with ETH Zurich, one of the leading international universities for technology and the natural sciences, to co-author a peer-reviewed paper on improving the capability to assess water stress indices. The purpose of the paper was to explain the impacts of freshwater consumption in life cycle assessments (LCA) of comparative energy sources.

For example, the amount of water required to generate a unit of energy from natural gas is smaller than that required to generate a unit of energy from other sources, including hydroelectric power and ethanol. See www.exxonmobil.com for more information.

The internal company standard for sustainable use of water resources calls for minimal impact on the environment, surface, ground, and the sea water. This standard regulates input data for planning work and designing facilities.

Where appropriate, ExxonMobil conducts a detailed analysis of water use-related risks and develops site-specific management strategies such as the deployment of water conservation technologies, the use of alternative freshwater sources, recycling of municipal and industrial wastewater and harvesting of rainwater.

ExxonMobil responsibly manages process wastewater and produced water. Produced water, a byproduct of upstream oil and gas operations, is injected into deep underground reservoirs. At offshore production facilities, produced water is re-injected into reservoir or treated in accordance with applicable regulatory requirements and discharged into the marine environment.

From 2014 to 2015, ExxonMobil conducted a series of sampling and modeling initiatives to evaluate how produced water discharges might interact with the local marine environment. The results showed the amount by which the concentration of discharge components vary day-to-day and the way discharges mix in the sea with the surrounding currents. The study will continue in 2016.

Oil Spill Prevention and Response

ExxonMobil implements measures to prevent oil spills and constantly explores possibilities to improve spill containment techniques. As a result, the number of oil spill in 2015 declined against 2014, and over the past five years the number of oil spills in excess of 1 barrel decreased by 30% Company-wide.

Consistent with its commitment to maintain the highest performance standards wherever it operates, the Company enforces stringent control over the technical conditions of pipelines and infrastructure facilities. To prevent corrosion and possible damage, the most advanced management, monitoring and alarm technologies are used.

ExxonMobil implements the internal oil spill response research and development program – the only one in the industry. One of the goals of this program – developing methods of operations in cold water and in remote areas such as the Arctic.

ExxonMobil also funded and advanced towards implementation the use of bio-degradable surfactants, which, when sprayed over an oil slick, compress and thicken it, allowing to burn the oil under controlled conditions.

The Company participated in developing a number of joint industry projects to enhance offshore oil spill response capabilities. Such projects include a Joint Industry Oil Spill Response Project under the International Association of Oil and Gas Producers (IOGP) and a joint industry project under IOGP and the International Petroleum Industry Environmental Conservation Association (IPIECA), and others.

Air emissions

ExxonMobil develops and implements measures to reduce pollutant emissions generated by industrial operations and production processes. As a result, the last 10 years have witnessed a total 45% reduction in emissions of volatile organic compounds (VOC), sulfur dioxide (SO₂), and nitrogen oxides (NO_x) across all Company's enterprises.

An example of this is retrofitting of the Baldar vessel, resulting in 21% annual reduction in nitrogen oxide emissions.

Participation in research and development programs

ExxonMobil annually invests about 1 billion USD in research and development to generate breakthrough technologies capable of benefiting not only business but also society and the environment.

Today, researchers and engineers are developing new ways to generate energy in more safe, effective, and environmentally responsible manner. Two examples - full wavefield inversion and cutting-edge well drilling technologies. These technologies are based on the use of supercomputers, which can perform as many operations as are pushing the computing capabilities of present day computer hardware to their physical limit. Supercomputers can handle vast data volumes to identify trends which prompt the best solutions to ensure the best outcomes.

Full Wavefield Inversion (FWI), the kingpin of ExxonMobil's seismic toolbox, is made possible by use of supercomputers, which opens up for geoscientists unprecedented vistas of incisive research into the physical properties of rock and subsurface structures. In the past, petroleum sector was only able to use part of seismic data from 3-D seismic studies.

FWI enables the Company to better leverage data from a seismic survey to produce high-definition images of the subsurface allowing to develop and produce more efficient and less costly. This simplifies the process of resource discovery and development, which ultimately helps to reduce impacts on the environment. FWI also enables to evaluate data with more certainty — and in a time frame that is practical for business applications.

Advances in well drilling and completion technologies enabled the energy industry to reach new sources of oil and natural gas. Recent innovations in advanced drilling technology, such as ExxonMobil's proprietary Vybs software, are helping bring about new efficiencies and environmental benefits.

Vybs is the latest breakthrough technology used to overcome factors that limit drilling efficiency. Vybs uses sophisticated algorithms to understand and harness the vibrations at the end of a drill string. Vybs uses kinetic energy from the drill string, thus reducing the amount of energy needed from the rig to penetrate the subsurface. Improving drilling efficiency means wells can be drilled faster, which reduces costs and the amount of time spent with a drill rig on location

In addition to helping reduce the costs associated with drilling, this technology also helps reduce the environmental impact of energy production by allowing more oil and gas to be produced with fewer wells.

ExxonMobil is partnering with approximately 80 universities around the world to explore next-generation energy technologies.

In October 2014, ExxonMobil became a founding member of the MIT Energy Initiative, a unique collaboration that aims to advance and explore the future of energy. Since launching the collaboration with MIT, the joint research program has made inroads into several areas, including bio-enriched catalysts for petrochemical industry and computational modeling to better understand the properties of iron and iron-based alloys used in pipelines. The program has also enabled ExxonMobil to expand research efforts to emerging areas like photovoltaic and nuclear power, as well as enhance our understanding of energy generation options.

In 2015, ExxonMobil entered a partnership with E-affiliates, a program administered by Princeton University, to pursue transformational innovations in the fields of energy and environment. The Agreement enables any division of ExxonMobil to join any of the University's departments or labs to do a research project.

ExxonMobil funds a number of bio-fuel programs, including bio-fuel production from algae, and a program of processing non-food feedstock such as cellulose biomass, algae-based feedstock, and cellulose sugar, to produce high efficiency fuels. New ways of technology improvements and new discoveries are still indispensable for optimizing biomass production and biomass conversion to fuel. Specifically, breakthrough discoveries are critical for commercial-scale bio-fuel production while complying with principles of cost effectiveness and environmental safety by way of minimizing green-house gas emissions.

5. ENL ENVIRONMENTAL PROTECTION POLICY

The environment policy of ExxonMobil calls for doing business in a way that maintains a balance between the environmental and economic interests of population and host countries where the company operates. The Company is at all times committed to improving its environmental performance across all assets on a global scale.

In line with these expectations, the key principles of ExxonMobil's worldwide environment policy include:

- Complying with all applicable environmental protection laws and regulations, and applying responsible standards where such laws and regulations do not exist;
- Cultivating a caring and respectful attitude toward the environment, making each employee more accountable for environmental protection, and putting in place appropriate industrial practices and personnel training;
- Cooperating with the public authorities and industry groups to draft in a timely manner effective science-based environmental protection laws and standards, taking into account risk, cost and benefit analysis, including energy-saving and product supplies;
- Managing business operations so as to prevent accidents and monitor harmful emissions and waste and keep them within safe limits; Designing, operating, and maintaining facilities in a proper manner;
- Promptly and effectively responding to accidents caused by the Company's operations in cooperation with industry regulators and public authorities;
- Conducting and sponsoring research aimed at improving the understanding of potential industrial impacts on the environment, improving the environmental protection practices, and helping the company to make its operations and products more compliant with nature conservation standards;
- Liaising with the public in matters of environmental protection and exchanging experience with a view to improving overall industry performance;
- Undertaking appropriate reviews and evaluations of operations to measure progress and to ensure observance of the principles outlined herein;

The principles of ExxonMobil's environment policy are incorporated into the internal regulatory document, *Standards of Business Conduct*, published at www.exxonmobil.ru

Exxon Neftegas Limited (ENL) develops resources as part of the Sakhalin-1 Project proceeding from the principles of environmental responsibility, which call for preventing or mitigating environmental impacts through the use of design solutions based on the latest technologies and carefully planned impact prevention and mitigation efforts. ENL pursues continual improvement of its environmental performance and commits to ever-increasing quality standards in its nature conservation activities.

Accordingly, ENL's policy is aimed at:

- ◆ Complying with all applicable environmental protection laws and regulations of the Russian Federation and the application of principles of environmental responsibility in those cases where such laws and regulations do not exist;
- ◆ Honoring obligations under the Production Sharing Agreement and submitting complete information about operations and Sakhalin-1 Project implementation plans to the Russian inspection and oversight authorities;

- ◆ Working with the Russian public authorities and industry groups to foster timely development of effective environmental laws and regulations based on sound science and considering risks, costs, benefits, and effects on energy and product supply;
- ◆ Assessing industrial and environmental risks as well as the risk of socioeconomic and public health impacts across the facility design, construction, operation, and abandonment phases. Planning and implementing risk mitigation measures;
- ◆ Conducting a comprehensive assessment of environmental, socioeconomic, and public health impact during the facility design, construction, and abandonment phases;
- ◆ Developing and applying appropriate additional protection measures for operation areas potentially vulnerable to enhanced risks for biodiversity and/or biological species by thoroughly studying the area's environmental set-up;
- ◆ Ensuring effective environmental performance, including:
 - Implementing a program to protect biodiversity and ecosystems;
 - Preserving migration routes of wildlife;
 - Improving the water management systems;
 - Reducing air pollutant emissions;
 - Reducing landscape fragmentation;
 - Performing reclamation and remediation of disturbed lands;
 - Monitoring and reducing fuel and lubricant leaks;
 - Monitoring and using effective waste management processes and neutralizing waste;
- ◆ Conducting systematic industrial environmental supervision and environmental monitoring;
- ◆ Devoting particular attention to accident prevention across all project phases;
- ◆ Inspecting, repairing, and maintaining pipeline routes;
- ◆ Responding quickly and effectively to incidents resulting from project operations in cooperation with industry organizations and public authorities;
- ◆ Avoiding operations in areas of specially protected natural territories and world heritage sites;
- ◆ Developing the environmental office program;
- ◆ Improving the energy efficiency of production processes;
- ◆ Continuing to promote a sustainable and caring attitude toward the environment of Sakhalin Island, making each company employee accountable for environmental protection in the workplace, putting in place appropriate work processes and conducting regular professional and environmental staff training;
- ◆ Conducting and sponsoring research to improve understanding of the impact of the Sakhalin-1 Project on the environment, to improve methods of environmental protection, and to enhance capability to make operations and products compatible with the environment;
- ◆ Promoting a policy of respect for the interests and rights of indigenous minorities of the North and maintaining a constructive interaction with representatives of indigenous people local communities. Planning the Company activity considering the traditions of natural resources use;
- ◆ Maintaining a dialog with the local community in matters of environmental protection, sharing ENL experience with other organizations;
- ◆ Undertaking appropriate reviews and evaluations of their operations to measure progress and to ensure compliance with this policy.
- ◆ Applying the principles of the corporate environment policy to operations of contractors;
- ◆ Prohibiting the Company's employees (including those of contractor companies) from hunting and other intrusive activities in the area of operations.

6. Comprehensive assessment of Sakhalin-1 Project environmental, socioeconomic, and public health impact.

ENL has conducted a comprehensive assessment of its impacts on the environment, socioeconomic conditions, and public health as part of the Sakhalin-1 Project across all phases - *from construction to abandonment*:

- in preparing materials for *Justification of Investments in the Sakhalin-1 Project – Phase 1 “Development and Production” in 2001*;
- in preparing the Sakhalin-1 Phase One TEO Construction for Chayvo and Odoptu field development in 2002-2004;
- in preparing the design package for the 1st phase of Odoptu Field development in 2007-2008;
- in preparing the Arkutun-Dagi field development plan in 2008-2010.
- in preparing the design package for the 2nd phase of Odoptu Field development, including infrastructure development projects, during the period from 2013 up to now.

The process of a comprehensive assessment of impact on the environment, socioeconomic conditions, and public health is based on a systemic approach and includes the following main elements:

- ◆ Research and analysis of the environmental and socio-economic background conditions before planning project operations;
- ◆ Analysis of the potential environmental impact of the proposed activity and evaluation of its significance at all stages of the project, from planning to implementation and abandonment;
- ◆ Consultations with stakeholders concerned with the environmental, social, economic, and other aspects of the proposed activity with a view to find mutually acceptable solutions;
- ◆ Submission of materials of a comprehensive EIA for approval by the relevant public authorities. The company received favorable state environmental expert review conclusions or/and Glavgosexpertiza of Russia expert conclusions in compliance with RF legislation requirements;
- ◆ The use of impact assessment results in the decision-making process relating to the proposed activity.

The development of measures to mitigate the adverse impact is one of the main components of the EIA process.

7. ENVIRONMENTAL IMPACT PREVENTION AND MITIGATION

In the development of measures to prevent the impact and environmental protection programs, ENL uses the experience of other international oil and gas projects in regions with sensitive natural resources and places where indigenous peoples live. The applicable mitigation measures which had proven effective in other regions of the world were selected and adapted to the specific conditions of the Sakhalin 1 Project implementation region in the context of legal regulation in the Russian Federation.

In the development of environmental protection measures by ENL, sources of impact are identified, their characteristics that affect environmental components are studied, and, if necessary, numerical modeling of the spread of pollution is performed. Modeling was done for the most intense operation and the worst weather conditions.

Based on the results, measures are developed to ensure compliance with environmental and health standards of the Russian Federation.

7.1. Air Quality Protection

Measures to Reduce the Negative Impact on Air Quality

- ◆ Use of modern vehicles, construction machinery, and equipment in proper operating condition;
- ◆ High-quality maintenance of vehicles, construction machinery, and equipment;
- ◆ optimizing traffic and the operation of process equipment;
- ◆ Use of high-quality fuel (conforming to GOSTs);
- ◆ Use of methods of integration of structures and improvement of the technological availability of structures and materials;
- ◆ equipping flare stacks with devices for soot-free combustion;
- ◆ sealing of process equipment;
- ◆ Use of high-seal-class shutoff and control valves and connections;
- ◆ Cleaning dust-containing emissions from the bulk handling pneumatic system
- ◆ Use of incinerators with exhaust gas afterburners;
- ◆ Onshore and offshore pipeline burial.

Program to reduce greenhouse gas emissions

Under the Program for Environmental Protection and Environmental Monitoring, in order to reduce greenhouse gas emissions ENL conducts the following types of operations for utilization of associated petroleum gas:

- ◆ Reinjection of produced gas;
- ◆ Providing gas for outside customers (Khabarovsk Krai);
- ◆ Use of produced gas for needs of production facilities of the company (boilers, gas generators).

From the beginning of ENL production activity in October 2005 through December 2014, the level of associated petroleum gas flaring and/or dispersion in the atmosphere has averaged 3.34% of the total volume of gas produced. This indicator was 2.1% overall for the Sakhalin-1 Project in 2015.

The decrease in the produced gas flaring ratio is due to the implementation of technical measures to improve Odoptu-Chayvo OPF oil pipeline performance. Installing a station for gas compression and reinjection at Odoptu in 2014 stabilized and lowered the gas flaring ratio.

Additional gas injection compression units will be installed as Odoptu Field development continues and oil and gas production volumes grow.

7.2. Protection of Surface Water

The key technical and organizational measures to prevent impact on water bodies are:

- ◆ use of marine vessel wastewater treatment facilities that comply with the International Convention for the Prevention of Pollution from Ships (MARPOL).
- ◆ Use on the platform of wastewater treatment facilities that comply with pollutant discharge limits prescribed by laws of the Russian Federation;
- ◆ Laying of pipeline under the seabed of Chayvo Bay using horizontal directional drilling;
- ◆ Optimizing the offshore pipeline route with the goal of reducing its length and reducing the impact on the marine environment;

- ◆ Minimum use of additives in water used for hydraulic testing of the onshore pipeline section and regulatory compliance for all discharges when water additives are used in pressure tests of onshore and offshore sections of the pipeline;
- ◆ injection of the main volume of drilling waste (and platform wastewater, where appropriate) into a disposal well;
- ◆ construction of culverts to preserve natural runoff;
- ◆ Measures to reduce the flow of suspended matter into water bodies during earth moving;
- ◆ Maximum use of the existing infrastructure;
- ◆ Choice of technology options for stream crossing construction based on hydrological and hydrochemical characteristics of the sites and water resources.

An analysis of design solutions and environmental protection measures leads to the conclusion that during normal operation the impact on water resources (surface water bodies and the marine environment) for construction operations as well as the operation of planned facilities complies with established Russian environmental protection requirements and international water protection standards.

7.3. Protection against physical factors

Physical impact factors include noise and vibration in the air and water environment, electromagnetic and ionizing radiation from equipment and technical devices, and equipment lighting and thermal impacts.

The main measures to mitigate impact are:

Light Impact

- Blackout screens will be installed to only allow light propagation in the desired direction.
- Aiming all general, safety, emergency, security and other light fixtures correctly.
- Switch off idle lighting equipment and, if possible, work during daylight hours.

Noise and vibration

- Use of acoustic construction methods to provide vibration and acoustic insulation,
- installation of mufflers on the exhaust and suction pipes of gas turbine engines and gas-pumping units, and screening of noisy units or groups of units.

Electro-magnetic radiation

- Placement of sources of electromagnetic radiation, with the direction and power of radiation selected according to the requirements of the laws of the RF,
- The use of modern technology with low levels of radiation to ensure compliance with health and industrial safety regulations,
- Strict enforcement of equipment operating rules.

Ionizing radiation

- Compliance with instructions for operation and storage of ionizing radiation sources,
- Training of personnel in the safe use of equipment,
- Compliance with industrial safety rules and all applicable requirements of the laws of the RF pertaining to sources of ionizing radiation.

7.4. Protection of the Geological Environment

Measures to protect the geological environment are ENL technical solutions and measures intended to ensure the safety of facilities in the event of earthquakes or other hazardous geological events, such as permafrost conditions change, soil decompaction and to prevent the development of new geological processes that are hazardous both for the facilities

themselves and for the environment: shore erosion, scouring, rising groundwater and bog formation, wind erosion of soils, etc.

The following measures will prevent the development of new geohazards:

- ◆ Platform jacket protection structure to prevent erosion of sediments around the platform;
- ◆ Protection of the sea coast by the creation of coastal protective structures;
- ◆ decreasing the area where the topography will be altered and the soil cover will be disturbed during construction;
- ◆ preserving/restoring natural groundwater flow and surface runoff to prevent rising groundwater and bog formation;
- ◆ reclamation of areas disturbed during construction.

During drilling and operation of wells, measures will be taken to ensure protection of subsurface resources and efficient use of mineral resources, as required by RF regulations. This will be done by means of advanced drilling technologies which permit the maximum possible utilization of the field's natural hydrocarbon reserves.

Drilling waste is disposed of into deep isolated subsurface formations via dedicated wells 2.5 to 3 km deep.

After production ceases in each well, a set of plugging and abandonment operations will be carried out to ensure that they are reliably isolated and subsurface resources are conserved.

7.5. Reducing Natural Landscape Fragmentation, Soil Protection, and Land Remediation

Sakhalin-1 reduces Natural Landscape Fragmentation through the use of extended reach batch drilling (drilling of wells from a small pad, with 5 meters wellhead spacing), construction of line facilities within the existing utilities corridors, deployment of areas facilities within the existing construction sites.

Measures for the protection of soils during construction and operation are common to all Sakhalin 1 facilities and involve, first and foremost, the following preventive measures:

- ◆ stabilization of soils on construction sites
- ◆ anti-erosion measures (i.e., the preservation of existing vegetation, anchoring slopes, and controlling surface runoff, where possible)
- ◆ thorough waterproofing of all settling tanks (storage and separator tanks, etc.);
- ◆ Injection of drilling waste into deep aquifers
- ◆ Installation of drainage systems, monitoring of groundwater, and measures to prevent underflooding and marsh formation
- ◆ Environmental monitoring of all operations in the construction and operation phases
- ◆ Mechanical and biological remediation of lands disturbed during construction
- ◆ In accordance with the ENL policy, prohibition of the collection of vegetation and other intrusive activity in the project area.

In addition to general preventive measures, the measures to protect the soil during construction and operation include:

- ◆ Use of methods of integration of structures and improvement of the technological availability of structures and materials
- ◆ Trenching using advanced international experience under such conditions
- ◆ Concreting the pipelines or using concrete for their weighting to prevent the pipes from lifting up in soggy areas
- ◆ Use of water treatment systems, oil and gas separators, and other water treatment facilities
- ◆ Bunding of the most environmentally hazardous facilities
- ◆ Use of incinerators equipped with special filter devices

- ◆ Inspection of machinery prior to work commencement and upon work completion to assess wear and tear of hydraulic equipment and machinery
- ◆ Mandatory provision of containment sumps installed on the machinery parked in its parking slots
- ◆ Prohibited placement of construction equipment outside its dedicated spots.

Remediation of land disturbed during construction will be conducted in two phases:

It is performed after the final stage of construction activities is completed (removal of construction wastes; demolition and removal of all temporary structures, installations and construction materials from the site; backfilling of pipeline trenches with a windrow required to ensure a plane surface after soil compactions; uniform distribution of organic soils over the surface) and consists of grading to create natural slopes of the surface.

The biological phase will consist of re-vegetation and restoration of the topsoil fertility. The usual planting of vegetation is performed at most sites, and accelerated planting of vegetation and hydroseeding are performed in areas where it is necessary to slow down erosion processes, such as on slopes and in streams.

7.6. Protection of vegetation and forests

The main sources of impact on vegetation in the construction phase are: vehicles and construction equipment, waste generated during construction, temporary and permanent structures, and local leaks during the construction.

The Project provides for the following measures to prevent or reduce the adverse impact on vegetation:

- ◆ Maximum use of the existing infrastructure;
- ◆ Erosion prevention measures;
- ◆ Removal of fallen trees and other flammable materials and compliance with fire regulations prescribed by the laws of the RF;
- ◆ Prohibition of moving trees and slash out to the forest edge;
- ◆ Compliance with forest management regulations and requirements in accordance with the laws of the RF;
- ◆ Laying the onshore part of the pipeline system in existing utility corridors for other pipeline systems;
- ◆ Restoration of original contours of the site and drainage routes disturbed during construction;
- ◆ Prohibition of the collection of plants and other intrusive activity in the project area for ENL and contractor employees;
- ◆ Monitoring of the vegetative cover and monitoring of reclaimed land.

ENL environmental protection measures result in limiting the impact of the land allotment area without disturbing the vegetation of surrounding areas, followed by revegetation of the disturbed land.

7.7. Protection of terrestrial wildlife

A system of measures is used to reduce the potential impact on wildlife; the system includes:

- ◆ construction planning will take into account the periods of maximum vulnerability of individual species and groups of animals;
- ◆ The distribution of critical habitats, including places where migrants congregate in certain seasons, breeding grounds and the primary feeding areas of rare species, will be taken into account in planning the sites of construction areas and temporary camps.

- ◆ construction equipment will not be allowed to operate outside the boundaries of assigned areas;
- ◆ vehicle traffic will be controlled to maintain the distances necessary to avoid disturbing nesting and rare colonial bird species and congregations of molting and migrating birds.
- ◆ unauthorized public access to and use of previously hard-to-access natural areas will be prohibited;
- ◆ hunting, gathering of eggs of nesting birds, destroying the nests of rare bird species, and visiting environmentally vulnerable areas during critical periods will be prohibited for people employed in the Project.
- ◆ Workers will familiarize themselves with the instructions on how to behave in the event of an encounter with wild animals when servicing and monitoring overland sections of the pipeline.
- ◆ All the requisite resources will be provided for the action plan for the rescue and rehabilitation of animals contaminated as a result of an oil spill.

Exxon Neftegas Limited's performance of a program of monitoring and measures to protect Steller's sea eagle is an example of effective positive action for the population of this protected species.



Steller's Sea Eagle, North Sakhalin population.

Program for monitoring Steller's sea eagles and other rare birds, entered in the Red Book of the Russian Federation or the Red Book of Sakhalin Oblast.

Since 1995 ENL has conducted a comprehensive program for monitoring the Steller's sea eagle population of as one of the most distinctive endemic species of the Russian Far East and the indicator species for the status of shore ecosystems within the scope of the Sakhalin 1 Project on northern Sakhalin. The main focus of monitoring is on the study of key population characteristics of the species and determining its stability under changing environmental conditions. These characteristics include demographic parameters such as population growth rate, population size, and sex and age structure of the population, as well as changes in the occupancy of nesting sites. In addition, the impact of predation by bears and the impact on the population of certain types of human economic and recreational activities were investigated.

During the program period, considerable factual material that comprehensively characterizes the state of the Steller's sea eagle population has been collected. Bioengineering work is done

regularly to maintain the eagle population. The work includes: Construction of artificial nests, construction of artificial perches, and fitting nesting trees with protective covers to prevent the destruction of nests by brown bears. Observations show that the birds readily use artificial perches for hunting and rest. Artificial nests serve primarily as places for overnight stops, handling of prey, and in some cases chick incubation and breeding.

Steller's sea eagle is included in the Strategy of Biodiversity Preservation in Sakhalin Oblast as a biological species used as an indicator of environment quality. ENL representatives participate in meetings of the biodiversity task force and workshops arranged by the Sakhalin Oblast Ministry of Natural Resources and Environmental Protection to discuss the methodology, biodiversity study and monitoring results.

The many years of monitoring Steller's sea eagle were crowned by publication of the book written by V.Masterov and M.Romanov THE PACIFIC SEA EAGLE *Haliaeetus pelagicus*: ecology, evaluation, protection. Moscow. KMK Partnership of Research Publications. 2014. 384 p. The book introduced unique Steller's sea eagle study data into scientific use. Writing and publishing of the book was sponsored through ENL charitable activity program.

In addition to monitoring of the Steller's sea eagle, ENL monitors other bird species listed in the Red Book of the Russian Federation and the Red Book of Sakhalin Oblast, as well as migratory, nomadic and colonial nesting species in the course of operation of Sakhalin 1 facilities. Studies on the state of populations of rare and endangered species and assessment of the types and level of impact of facilities on breeding and migrating birds are conducted in control areas in the immediate vicinity of major production facilities.

Monitoring results show that these species' nesting and feeding grounds were not disturbed significantly during construction, which is why the spatial configuration of their colonies was preserved in the operation phase and they continued to nest and feed in the same places where they did before construction began.

The findings of the monitoring of, and research into various bird species were presented at the meetings of the biodiversity work group under the Sakhalin Oblast Government, International Conference on Migratory Birds of Water and Marsh Rangeland, Yuzhno-Sakhalinsk, 2013. Lectures on the following subjects were delivered to college and school students:

- The birds of Piltun Bay
- Steller's sea eagle monitoring
- Wildlife protection during oil spills .

The research findings are also presented in the article by V.Zykov, Z. Revyakin, N. Pechenev ***Fall Migration of Bewick's Swan in Piltun Bay***, Yuzhno-Sakhalinsk, 2013.

In 2010, company specialists prepared the Field Guide for Identification of Rare Birds Listed in the Red Book of the Russian Federation and Sakhalin Island and Encountered in Sakhalin Island and also in Vicinity of the Sea of Okhotsk and Tatar Strait. The guidebook was provided to concerned specialists and libraries in Sakhalin Oblast.

7.8. Protection of aquatic biota and commercial biological resources

During the construction and operation of onshore oil production facilities, the impact on water bodies and commercial bioresources is a result of the construction of water body crossings, earthmoving, and pressure testing of pipelines.

Offshore operations include preparation of the seabed for the installation of the platform, excavation and filling of trenches for laying pipelines, noise exposure during the movement of construction, transportation, and supply vessels, and discharge of WBM and cuttings on the seabed during the installation of surface casings and drilling of shallow well sections. These impacts will increase turbidity, and the work may have mechanical impacts on aquatic organisms as a result of intake of seawater for utility and process water.

The Project will be carried out on the basis of the principle of minimizing the negative impact on aquatic biota, commercial biological resources, and their habitat. ENL implements the following main environmental protection measures:

- ◆ Enforcing the strict observance of land allocation boundaries, particularly in water crossing areas and near bodies of water;
- ◆ Performing vehicle maintenance at least 100 meters from watercourses;
- ◆ Using a water filtration system after pressure testing of pipelines;
- ◆ Using modern equipment that reduces water turbidity during excavation and filling of the pipeline trench;
- ◆ Water intakes equipped with fish protection systems
- ◆ Implementing ship sewage discharge according to MARPOL standards and RF statutes.
- ◆ The condition of construction projects will be checked regularly.
- ◆ Monitoring of the aquatic biota to assess the condition of plankton, bottom-dwelling communities during operation of offshore Sakhalin-1 Project facilities

ENL also assesses the damage to fishery resources during project activities and performs compensatory measures for the artificial reproduction of Pacific salmon and chum salmon in Sakhalin Oblast and Khabarovsk Krai.

7.9. Protection of marine mammals

The main potential impacts on marine mammals in the construction and operation phases are associated with the physical presence of facilities and vessels, noise generated by industrial equipment, vessels, and aircraft, and discharges of sewage and wastewater treated to comply with the standards. ENL has developed a system of measures to protect marine mammals and their habitat with the goal of minimizing potential impacts on migration routes, feeding areas, and breeding areas and preventing the deaths of animals.

The system of measures for the protection of marine mammals has been tested successfully and improved steadily in the course of the Sakhalin 1 Project. It includes the following basic elements:

- ◆ Monitoring of activities in the work area during all periods of noisy and potentially disturbing operations;
- ◆ In the event of unacceptable levels of noise impact on animals, the source of the noise will be determined, and the noise level will be reduced with mechanical insulation, where this is possible;
- ◆ Temporary shutdown of unused equipment;
- ◆ Use on marine vessels of wastewater treatment units that meet the requirements of the Russian Federation Maritime Registry and have been certified by the proper authorities;
- ◆ All fuel, chemical and waste handling activities will be carried out in a manner designed to minimize or eliminate chronic inputs and accidents. The offshore platform and support vessels will have the necessary equipment and materials to prevent small spills.

Discharges of household sewage from ships and the platform treated to comply with standards have a negligible impact on marine mammals.

Some level of noise will be generated by construction and operations in the Sakhalin 1 area regardless of the mitigation measures.

On the whole, the project will not have a perceptible impact on marine mammals, and the environmental protection measures will reduce any residual impacts to slight.

Marine Mammal Monitoring Program

The research conducted on northeastern Sakhalin in conjunction with the Program for Monitoring the Okhotsk-Korean Population of Gray Whales for Exxon Neftegas Limited (ENL), the Sakhalin 1 operator, and Sakhalin Energy Investment Company (SEIC) began in 1997 and its results have significantly added to the existing scientific body of knowledge on marine mammals in the study area.

ENL organizes annual integrated field studies of gray whales on the northeast shelf of Sakhalin Island jointly with SEIC. The work involves scientists from the Institute of Marine Biology and the RAS Institute of Pacific Oceanology, as well as experts from Sakhalin State University. The Monitoring Program is one of the longest multi-disciplinary research programs that focuses on specific marine mammal species in a specific area.

Program objectives include expansion of the body of scientific knowledge of gray whales and their environment, as well as the factors that influence the population and its habitat, and assessment of the population (e.g., the population size, increase, etc.) and habitats.

Information received under the Program is used by ENL for the following purposes: minimizing the harmful effects of industrial operations on the whales and their habitats, and defining and implementation of measures to reduce risks to gray whales and their habitat during industrial operations.

Work is conducted in several directions, and includes the following key areas of research: Photographic identification of gray whales, study of their distribution, identification of individual whales and assessment of their condition, study of benthos to assess the food supply, and acoustic monitoring and to define the acoustic environment. Sometimes there are additional studies such as satellite tagging.

The satellite tagging program in 2010-2011 achieved outstanding results which led scientists to review available data on the migration routes of the gray whale in the Pacific Ocean basin.

The issue of extinction of the population has been eliminated. There has been a steady increase in the number of gray whales that feed near the northeast coast of Sakhalin Island.

In order to reduce or eliminate impact on gray whales, the company has developed and annually updates a Marine Mammal Protection Plan which has proven its effectiveness. Commitment to following the Plan is not limited to ENL but also applies to all the contractors of the Sakhalin 1 Project.

Thanks to the Plan, there has not been a single documented case of injury to marine mammals in all the years of ENL operations.

The 1995-2015 findings of research into marine mammals went into a collection of articles of the XVth Academician L.M.Brekhovskikh workshop school **Ocean Acoustics** on May 24-27, 2016, P. Shirshov Institute of Ocean Studies, Russian Academy of Sciences, Moscow, Russia published in Russian - see www.ocean.ru :

- R. A. Korotchenko, V. G. Ushchipovsky ACOUSTIC SIGNALS OF THE GRAY WHALE RECORDED ON SAKHALIN'S NORTH-EASTERN SHELF

V.I. ILYICHEV Institute of Pacific Ocean Studies under the Far eastern division of the Russian Academy of Science;

- V. A. Gritsenko AUTOMATED SEARCH FOR GRAY WHALES VOCALIZATIONS, V.I. ILYICHEV Institute of Pacific Ocean Studies under the Far eastern division of the Russian Academy of Science

- I.V.Medvedev DATA AND COMMAND TRANSPORT ASSOCIATED WITH SATELLITE COMMUNICATION IN SUPPORT OF HYDROACOUSTIC MONITORING V.I. ILYICHEV Institute of Pacific Ocean Studies under the Far eastern division of the Russian Academy of Science, and others can be found in English here:

www.researchgate.net/publication/291505073 Life History and Production of the Western Gray Whale%:

- Natalia L. Demchenko, John W. Chapman, Valentina B. Durkina, Valery I. Fadeev
Life history and production of the western gray whale's prey, *Ampelisca eschrichtii* Krøyer, 1842 (Amphipoda, Ampeliscidae)
 - Laboratory of the Ecology of Shelf Communities, A.V. Zhirmunsky Institute of Marine Biology of the Far Eastern Branch of the Russian Academy of Sciences,
 - Dept. Fisheries and Wildlife, Hatfield Marine Science Center, Oregon State University,
 - Laboratory of Cytophysiology, A.V. Zhirmunsky Institute of Marine Biology of the Far Eastern Branch of the Russian Academy of Sciences;
- Regional Studies in Marine Science journal homepage:
www.sciencedirect.com/science/article/pii/S2352485516300342
- Yevgeny Kriksunov, Ali Alyautdinov, Alexander Bobyrev, Sergey Chistov,
Moscow State University, Biological Faculty, Institute of Ecology and Evolution,
Russian Academy of Sciences
Study of associativity between the spatial distributions of gray whales and their prey species offshore north-east coast of Sakhalin Island.

ENL attended international Conferences to discuss marine mammals:

- ◆ International Conference on Biodiversity, Ecology and Conservation of Marine Ecosystems 2015 (BECOME 2015), Hong Kong, June 01-04, 2015, www.biosch.hku.hk/become/index.html

Evgeniy Kriksunov (presenter), Alexander Bobyrev (presenter), Ali Alyautdinov (attendee), Sergey Chistov (attendee)

Study of associativity between the spatial distributions of gray whales and their prey species offshore north-east coast of Sakhalin Island;

- ◆ 21st biennial conference on the biology of marine mammals 13-18 dec 2015 San Francisco, USA, www.marinemammalscience.org/conference/

P.A. Permyakov, A.M. Trukhin, V.I. Il'ichev Pacific Oceanological Institute, FEB RAS,
Extent of anthropogenic impact on Phocid seals in mouth of Piltun Bay (Sakhalin) depending on the type of disturbance

A.M. Trukhin, P.A. Permyakov V.I. Il'ichev Pacific Oceanological Institute, FEB RAS
2014 seasonal dynamics of pinnipeds on the haul-out in a mouth of Piltun Bay (Sakhalin)

In 2015 ENL participated in the Inter-agency work group under the RF Ministry of Environmental Protection:

- ◆ Inter-agency work group meeting to preserve the Okhotsk Korean Gray Whale Population, November 30, 2015:

1. Field work review under the Program to monitor the Okhotsk-Korean Gray Whale population, 2015 field season (V. V. Efremov, ENL).

2. Review of 2016 work plan to monitor the Okhotsk-Korean Gray Whale population off north-eastern Sakhalin (A. D. Samatov, Sakhalin Energy). (Joint Program)

3. Work review and measures to mitigate impact on the Okhotsk-Korean Gray Whale population during ENL's 2015 3-D seismic (V. E. Nechayuk, V. E. Kalinin, ENL)

- ◆ Inter-agency work group meeting to preserve the Okhotsk Korean Gray Whale Population, April 28, 2016:

1. Results of 2015 monitoring of the gray whale for abundance and distribution off north-eastern Sakhalin, S. A. Vladimirov (SMM)

2. Benthos status in the gray whale feeding areas off north eastern Sakhalin in 2015, V. V. Ivin. Institute of the Biology of the Sea, Far Eastern Division, Russian Academy of Science

3. Acoustic and hydrophysical studies of north eastern Sakhalin, 2015. M. Yu. Fershalov, (Pacific Oceanological Institute, FEB RAS)

4. Work plan review for gray whale monitoring off north eastern Sakhalin, 2016. A. D. Samatov, Sakhalin Energy (Joint Program)

5. Plan to protect marine mammals at the time of 2016 Sakhalin-1 offloading operations in Piltun Bay. E.N.Kalinin (ENL)
6. ENL 2015 seismic. Summary of cumulative impact. E.N.Kalinin, V. E. Nechayuk . (ENL)

7.10. Preservation of protected natural areas and environmentally sensitive areas

ENL fully recognizes the importance of unique, irreplaceable, and ecologically, scientifically, culturally, and aesthetically valuable natural complexes and natural monuments in Sakhalin Oblast and Khabarovsk Krai. In order to prevent adverse effects on protected areas, Sakhalin 1 facilities are located outside these areas.

Specially protected nature territories of the Sakhalin Oblast include 2 national natural reserves, 1 natural park, 15 national nature sanctuaries, 45 natural monuments.

The specially protected natural areas near the work area include:

- ◆ The Nogliki regional State Nature Sanctuary (the northwest boundary of the sanctuary is about 0.2 km from the onshore pipeline from the Chayvo OPF to Nevelskoy Strait)
- ◆ Vagis Mountain Range regional natural monument (the southern boundary of the monument is 1.4 km from the onshore pipeline from the Chayvo OPF to Nevelskoy Strait)
- ◆ Wrangel Islands regional natural monument (4.1 km from Odoptu WS1 and 3.25 km from Odoptu WS2)
- ◆ Lyarva Island regional natural monument (32 km from the Orlan platform and 36 km from the Chayvo WS)

Protected areas of Khabarovsk Krai include six national natural reserves, eight national nature sanctuaries, 226 natural monuments, and 20 natural resource refuges. Protected areas within the Khabarovsk Krai which are located proximate to the project facilities (Map 9.3) include:

- ◆ Ustrichny Island local natural monument (the distance from the DeKastri oil export terminal is 7.5 km)
- ◆ Somon Lagoon local natural monument (the distance from the DeKastri oil export terminal is 7.5 km)

The natural habitats and the condition of flora and fauna of these areas are not impacted by Sakhalin 1 facilities.

7.11. Protection of archeological and cultural monuments

Within the impact zone of Sakhalin 1 facilities are archeological, ethnographic, and historical sites which include ancient settlements, camps, and burial grounds of various periods and cultures.

Potential sources of impact on archaeological sites during the construction phase include earthmoving and other construction equipment. During construction, there are threats of direct impact on previously identified as well as unknown and newly discovered, archaeological sites.

The study and excavation of the archeological landmarks located directly within the boundaries of the construction sites will be carried out by ENL before the beginning of construction operations.

To ensure the preservation of archeological monuments, both those that are already known and ones that may be discovered, it is planned to carry out archeological monitoring in all phases of construction, which will help to increase the amount of information about the history and culture of indigenous minorities of Sakhalin.

In addition, ENL provides the following measures for the protection of archaeological and cultural sites:

- ◆ Surveying of the proposed construction sites for any possible archaeological sites
- ◆ Optimizing the location of construction sites in order to bypass valuable archaeological sites;
- ◆ Organization of training for construction personnel on how to handle archaeological artifacts;
- ◆ Daily interaction between the construction managers and persons responsible for archaeological monitoring;
- ◆ Allocation of resources and determination of the procedures for emergency excavation of sites, if archaeological material is discovered during the construction process.

Most of the artifacts found during those studies are gathered in the archeological museum of Sakhalin State University. The recovered archeological artefacts were also displayed in Sakhalin Oblast museums of regional studies.

7.12. Socio-Economic Impact

Implementation of the Sakhalin 1 Project is a stimulus to economic activity and has a beneficial effect on the economy and population of Sakhalin Oblast and Khabarovsk Krai, as well as on the economy of the Russian Federation as a whole.

This positive impact will be long-term (dozens of years), exceeding the duration of the Project itself because of the positive residual effects of revival of industry and the economy.

Implementation of the project began on schedule and rapidly reached the planned level of oil production of 250,000 barrels per day (33,000 tonnes per day).

More than 15 Gm³ of natural gas has been delivered to the Russian Far East customers.

The positive impact of the project is due primarily to payments and revenue for federal, regional, and local government under the PSA.

The PSA also states the intention to use Russian equipment and services in all cases where the cost, quality, availability, and delivery times do not impair the economic performance of the project. This relates to all stages of the project: Design, fabrication, construction, installation, and operation (including drilling operations) Opportunities for Russian participation are provided in several areas, including equipment, construction materials, labor for civil construction and for construction sites, pipeline construction, start-up operations as well as improvements to local infrastructure.

At the beginning of the project, the parties to the PSA (federal agencies and representatives of Sakhalin Oblast and ENL as the project operator) organized the Joint Committee on Russian Content for the Sakhalin 1 Project. The main objective of the Joint Committee is to assist in maximizing the involvement of Russian subcontractors and Russian suppliers of goods and services in the Project. The Joint Committee operates as a special working group to establish initiatives for Russian Content and conducts quarterly reviews of plans for ENL contract activity.

The Joint Committee works to keep potential Russian contractors and suppliers informed and develop a database of Russian contractors and suppliers. In particular, it conducts workshops for contractors and suppliers based on Sakhalin, where it informs them of current needs for the Sakhalin 1 Project, the terms of tender procedures, contract terms, etc.

Socioeconomic benefits associated with the project also include the creation of a significant labor market; reduction of the population loss from the areas of construction and operation of facilities; and increases in worker income and purchasing activity due to the purchase of equipment, materials, and services to meet the needs for construction and operation.

The project provides a number of measures aimed at strengthening the combined positive effects of its implementation:

- ◆ Construction and rotation worker camps will be built in accordance with international standards, giving due regard to applicable Russian regulatory requirements, which include installation of water supply and water treatment systems, wastewater treatment plants for sewage and drainage, removal of solid waste, etc.
- ◆ Application of the policy of preferred hiring of qualified local people to work at specific construction and operating sites. This applies especially to inhabitants of settlements located near the project and along the strip of land allocated for pipelines and access roads
- ◆ Providing training to local workers employed for the construction and operation of Project facilities;
- ◆ Incentives for contractors that advertise employment in regional and district media and select and hire employees from the local community.

Implementation of the Sakhalin 1 Project is conducive not only to raising the standard of living but also to the development of transportation infrastructure and improvement of the level and quality of educational, medical, and cultural services.

The Consortium has invested more than 120 million USD in the modernization of Sakhalin infrastructure, which is an unquestionable benefit for the local population. The objects of such modernization are hospitals and clinics, roads, bridges, ports, airports, and heat and water supply facilities. Examples include the Nogliki airport and federal and municipal roads and bridges.

As part of a number of projects, including educational, health care, youth, art, and social ones, social institutions have received charitable contributions totaling more than 3.5 million USD (85 million rubles). Examples are the Oblast Children's Hospital, the Women's Clinic of Yuzhno-Sakhalinsk, the Oblast Cancer Center, the Yuzhno-Sakhalinsk Chamber Orchestra, summer camps for children of indigenous peoples in the Okha and Nogliki districts, and development of the Oil and Gas Engineering Institute and its facilities.

ENL and members of the Consortium promptly respond to the public's needs and render assistance in the event of emergency situations such as the earthquake in Nevelsk in 2007.

7.13. Waste management

Proper waste management is a priority of the ENL Sakhalin 1 Project. There are various waste types (Hazard Class 1-5) anticipated to be generated from the construction, drilling, and operation activities within the Sakhalin 1 Project. The waste management strategy is comprised of:

- ◆ Classification and identification of wastes
- ◆ Waste sorting at the source, accumulation and/or storage of waste in dedicated sites
- ◆ Additional waste management, as appropriate (compaction, segregation)
- ◆ Waste transportation from the company's operational facilities to waste processing, neutralization, and disposal sites
- ◆ Recycling and reuse
- ◆ Waste neutralization in company's incinerators or by specialist contractors
- ◆ Final waste disposal to landfills or injection wells
- ◆ Monitoring and reporting

ENL constantly strives to use the services of licensed contractors:

- ◆ Manage and operate Sakhalin 1 Project waste management facilities; and/or
- ◆ Provide acceptable alternatives to Sakhalin 1 Project waste management facilities

First and foremost, all Sakhalin 1 facilities and operations will seek opportunities to minimize the amount of waste generated according to the following hierarchy:

- ◆ Preventing or reducing the amount of waste generated on site

- ◆ Environmentally safe reuse or reclamation of the wastes;
- ◆ Environmentally safe processing of the wastes;
- ◆ Environmentally safe burial of wastes.

Additional waste management technologies will be evaluated on an ongoing basis from the data during detailed engineering design and with data from facility operations. For example, other waste management strategies may include pretreatment of hydrocarbon-contaminated wastes and increased utilization of deep well injection for disposal of other suitable waste types, such as hydrocarbon liquids and solids, and treated wastewater.

To move waste from the facilities where it is generated and stored to the processing and disposal facilities, a Transportation Program was designed according to changing road conditions and the seasonal impact on the road surface, as well as to provide adequate safety for human beings and the environment. All the plans and decisions concerning waste transportation, are coordinated by ENL and its appointed Contractor.

Wastes that cannot be recycled or reused and/or are not being stored will require further treatment and final disposal. The Project provides for the disposal of drilling mud, cuttings, and formation water by injection into wells. To dispose of spent drilling mud and cuttings, dedicated injection wells were drilled to a depth of 2.5 – 3 km. Separate wells were drilled in some cases for injection of produced water and wastewater. The target injection intervals are sandwiched between thick isolating formations that rule out any potential impacts from injection on subsurface water and groundwater.

The thermal neutralization method is used to reduce hazardous properties of wastes and reduce the volume of waste requiring final disposal. Campsite incinerators and fixed-hearth incinerator facilities are options available to treat construction and operation wastes arising from the Sakhalin 1 Project. Waste incinerators are available at all areal sites of the project.

All Sakhalin-1 Project wastes subject to subsequent disposal, recycling, neutralization, or burial at landfills are accumulated separately by type and hazard class at the company's dedicated temporary waste storage sites, in containers / packaging suitable for their type and hazard class in keeping with public health and environmental standards.

All wastes to be generated and managed within the Sakhalin 1 Project will be tracked as they move from point of generation through to disposal. This tracking system will be captured by a database developed specifically for Sakhalin 1 Project conditions. The tracking data will form the basis of regulatory reporting, and ongoing analysis of data will ensure that Project waste strategy objectives are met, and public health, safety, and the environment protected.

8. RISK MANAGEMENT AND EMERGENCIES PREVENTION

ExxonMobil's culture of risk management

Application of OIMS is required across all of ExxonMobil's functions and operations, with particular emphasis on design, construction and operations.

"OIMS is the way we do business. This system allows us to manage SSH&E risks in a consistent and reliable manner to achieve operational excellence. OIMS is embedded in our culture and has resulted in behaviors that reflect our core values." (Paul Schuberth, Upstream safety, security, health and environment manager)

For example, in 2005, drilling operations developed the hurt-free approach to personnel safety. The hurt-free approach was developed as an alternative to traditional treatment-based programs to align with the vision of Nobody Gets Hurt. The hurt-free approach program

provides a framework that enables a culture of caring while also allowing for insightful trends analysis through consistent assessment of actual severity of incidents and their potential consequences. In response to its success in our drilling operations, we rolled out the approach to the Upstream business in 2012 and are now implementing it company-wide.

ExxonMobil holds internal and external workshops and collaborative meetings to promote the hurt-free approach across the corporation and across industry. Company has been able to demonstrate that drilling operations can be performed all over the world in a safe and environmentally sound manner, whether in an Arctic environment or other high-risk environments with appropriate application of risk management principles and programs.

ENL risk management and accident/near accident prevention

The ENL strategy is based on the concept that all field development activities should be implemented in such a way as to minimize the risks to the environment and human health and safety. With respect to this strategy, all types of activities should be analyzed for the purpose of reducing the risks of potential hazards.

A risk assessment has been conducted on the Sakhalin Project to assess potential safety, health, environmental, and property impacts. The risk scenarios for Terminal Operations included overfilling the storage tanks, an earthquake, leaks from the pipe work or equipment, an oil fire, and a leak while filling the tanker.

The risk scenarios for Pipeline Operations included a leak due to 3rd party damage, a leak due to corrosion, a leak due to a seismic event, a leak due to soil conditions (freeze/thaw, mud slides), a leak due to material / construction defects, a leak due to human error during operations, an oil fire, and damage by a 3rd party in the areas of Tatar Strait, Nevelskoy Strait, offshore, and onshore.

As a result of the risk assessment performed for operations on platforms and at well sites and the OPF, leaks from pipelines, and the terminal in DeKastri, it was concluded that the risks for all scenarios by production facility can be prevented to ensure safety for the human beings and the environment.

The risk analysis procedure is conducted in the following sequential steps:

- ◆ Determination of potential causes to release a hazard
- ◆ Development of credible scenarios that lead to undesirable events
- ◆ Listing preventative safeguards that may prevent the event from occurring
- ◆ Listing the mitigating measures that may limit the extent of damage associated with the accident
- ◆ Describing the consequences of the event in terms of the potential for harm to people and the environment
- ◆ Analysis of scenario realization frequencies from historical data
- ◆ Development of solutions to reduce risk through the use of a risk matrix;
- ◆ Documenting any additional remedial measures or actions that may be considered to further reduce the risk associated with the scenario.

The necessary systems of safety measures and equipment meeting the requirements of applicable safety standards will be provided for all identified hazards.

Development of the necessary accident prevention measures and calculation of the manpower and equipment needed for timely response are provided by drafting such documents as the Industrial Safety Declaration, the Accident Response Plan, and the Oil Spill Response Plan.

Precautions to Prevent Emergencies

The risk of accidents is reduced and damage is minimized by general and specific safety measures (Table 1 and Table 2):

Table 1. General measures to minimize accident events:

Description of actions
Development and control of fulfilling detailed process regulations
Training and examination of personnel knowledge
Regular technical maintenance of equipment
Anticorrosive protection of equipment
Regular inspections and checkups of safety assurance systems
The quality of construction and assembly work shall be inspected.
Operations shall be subject to continuous industrial and environmental monitoring.

Table 2. Special measures for minimization of emergencies situations:

Description of actions
Separation and isolation of technological processes and equipment (safety, cutoff valves, etc.);
Early hazard identification systems (gas analyzers, etc.);
Automatic leakage control system;
Equipment Emergency Shut-down Systems
Construction of secondary safety barriers (levees, trays, drains, waterproofing geomembranes)
Passive and active fire protection systems

Technology and work management take into account the high seismicity of the production facility locations and exposure to other geological hazards (underflooding, gulying, marsh formation, etc.), specifically by the development of measures to prevent the manifestation and effects of these processes.

Appropriate measures must be taken to protect the facilities and monitor personnel on each site from the time of mobilization for construction at the sites and throughout the equipment operation period.

Fire protection activities at the facility are a part of general strategy aimed at accident-free operation of technological equipment.

The basic principles of fire safety used in developing fire-protection measures are:

Compliance with RF regulatory requirements governing fire safety in the design, construction and operation of a facility;

- ◆ Use of modern fire prevention and fire protection systems and administrative and technical fire protection procedures
- ◆ In accordance with RF regulations, the fire safety of Sakhalin 1 facilities is ensured by:
 - ✓ Fire prevention system;
 - ✓ firefighting systems;
 - ✓ A system of organizational and technical measures.

The fire-prevention system calls for:

- ◆ The use of new technologies and process equipment ensuring the highest degree of fire safety;
- ◆ Use of slow-burning and incombustible materials;
- ◆ Reduction of the fire load
- ◆ Measures to prevent the formation of a combustible environment and the origination of ignition sources therein;
- ◆ Maximum process mechanization and automation;
- ◆ The use of devices to protect equipment from damage and accidents, including accidents during repairs, and other measures.

The fire prevention system is deployed in the form of specific technical solutions: In the master plan, the production part of the plan, power supply, ventilation, etc.

Administrative and technical measures include:

- ◆ Organization of fire safety of facilities and cooperation of fire safety services with territorial subdivisions of the State Fire Fighting Service;
- ◆ Determination of fire hazard levels of substances, materials and technological processes;
- ◆ Providing fire safety training for employees;
- ◆ Development of facility-specific regulations, instructions and other documents for handling inflammable substances and materials
- ◆ Development of measures for personnel actions in the event of a fire, and the organization of evacuation of personnel;
- ◆ Implementing technical solutions to provide for successful fire extinguishing
- ◆ Specifying the procedure for storing substances and materials which cannot be extinguished with the same agents
- ◆ Using devices for automatic and automated protection of the facility's production equipment from unauthorized and mistaken actions of personnel that may cause fires or explosions
- ◆ Schedules for testing and maintaining active fire-protection subsystems, etc.

ENL readiness for emergency prevention and response

ENL readiness for emergency prevention and response is ensured by the following:

- ◆ Creating a three-tier operations command system for oil spill response which includes the use of company's own manpower and resources, as well as response professionals from contractors acting as a coordinated group for emergency response at the facility;
- ◆ Availability of manpower and resources for prevention and containment of emergencies at Sakhalin 1 production facilities;
- ◆ Creation of a personnel education and training program dealing with emergencies, including study of the features of production facilities and areas of applicability of the Plans and special equipment and procedures for its use, as well as development of tactics for dealing with emergencies at a single complex;
- ◆ Response capability will be provided by ENL with assistance, as required, from other Sakhalin, Russian Far East, and international resources.
- ◆ Protection of ENL facilities against adverse natural and man-made impacts.
- ◆ Compliance with industrial, environmental, and fire safety requirements during field exploration, development construction, production and during storage of oil and oil products.
- ◆ Buildup of reserve of material and financial resources for Emergency Situation response.
- ◆ Compulsory liability insurance, consistent with requirements of the Sakhalin 1 Production Sharing Agreement, against damage from operations of hazardous industrial facilities.

Monitoring of the implementation of measures for emergency prevention, containment, and response is conducted by the relevant executive agencies of the Russian Federation with supervisory authority in the course of scheduled and unscheduled inspections in accordance with Russian regulations, as well as in the process of conducting drills and training on emergency containment and response.

9. OIL SPILL RESPONSE AND PREVENTION

Emergency risk analysis conducted in the course of the Sakhalin 1 implementation showed that accidents involving oil and product spills could cause the greatest damage to the environment.

The Sakhalin 1 Oil Spill Response and Prevention Plan (OSRP Plan) for existing facilities has been approved by the Ministry of Civil Defense and Emergencies and other regional and federal authorities.

The Plan covers all oil product spills that may occur at ENL oil production and export facilities for the Sakhalin 1 Project located on the Sakhalin Island shelf, on Sakhalin Island, and in the Tatar Strait, as well as in some Khabarovsk Krai mainland areas, including:

- ◆ the Sea of Okhotsk;
- ◆ coastal zones, including Chayvo Bay and Piltun Bay on the northeast coast of Sakhalin Island;
- ◆ land areas along the routes of main and field pipelines in northern Sakhalin Island;
- ◆ the Tatar Strait and Nevelskoy Strait, including the west coast of Sakhalin Island and the coastal areas of Khabarovsk Krai.

The purpose of the Plan is planning of oil spill prevention and response actions. The planning is intended to ensure timely and effective action to mitigate the effects of spills, maintain constant readiness of manpower and resources for emergency response, ensure safety and protection of human beings and the environment, and minimize potential damage to the environment and production facilities and losses in the event of an oil spill.

The Plan includes methods, rules, guidelines, and supporting information allowing ENL to:

- ◆ Proceed with timely and effective oil and oil product spill response in accordance with the laws of the RF using the manpower and resources of the company, contractors, and government agencies;
- ◆ Develop a procedure for initial emergency response to the most likely scenario of oil spill Level 1;
- ◆ Together with the RF Ministry of Emergencies, organize and coordinate the overall operation of oil spill response of Levels 2 and 3.

In accordance with the recommendation of the International Petroleum Industry Environmental Conservation Association (IPIECA) and the International Maritime Organization (IMO), the OSRP plan strategy during execution of the Sakhalin 1 Project is determined by the tiered approach to oil spill response (IPIECA 2000a). The three-tier approach is the standard in international practice for characterization of oil spills and deciding on appropriate response actions. A tiered OSR approach takes into account not only the size of an oil spill, but also its potential threat to human and environmental resources, the level of control the responders can gain over the situation, the speed of response implementation, and the availability of required OSR resources.

A tiered approach creates the conditions for the most efficient and aggressive combination of degrees of readiness to respond to a spill and carry out OSR operations. It promotes rapid and streamlined expansion of an OSR operation by involving initially the on-site resources and equipment, then local resources and equipment, involvement of regional assets, and then up

to the capabilities at the federal and even international level. The tiered approach is not restricted in terms of limited and sequential step- by- step escalation of resources and equipment; rather it can be expanded as needed to any level that is economically and environmentally justified.

Response strategies for major spills are executed in cooperation with Federal, Regional, and Local authorities at the time of the response.

The Oil Spill Response Plan provides for the use of ENL resources to ensure seamless management of processes of containment and response to spills of oil and oil products, including the following:

- ◆ Alerting and mobilization of ENL Emergency Response Team at the facility, as well as specialized response contractors, support staff, and equipment;
- ◆ Isolation of the spill source by operating personnel at the facility using process control systems, and ensuring of workplace industrial safety;
- ◆ Implementation of measures aimed at containing and cleaning up oil spills and their aftereffects;
- ◆ Waste collection and disposal;
- ◆ Restoration (Reclamation of territories)

Proper planning of OSR measures, identification of available manpower and resources, and adequately trained personnel will ensure the availability of sufficient human resources and response equipment for the most likely spills of all possible categories. Regardless of whether a spill is classified as a tier 1, 2, or 3 emergency situation, the actions of the ENL response group will facilitate containment of any spill within the timeframe prescribed by RF oversight authorities.

Containment and response to oil spills that occur at ENL facilities will be handled by specialized groups with which ENL has existing agreements using available equipment to respond to oil spills at ENL facilities. If necessary, additional forces may be enlisted from specialized outside contractors for oil spill response and cleaning contractors, along with internal ENL oil spill response teams from other facilities unaffected by the emergency.

The general ENL conceptual approach to oil and oil product spills provides for compliance with following principles:

- ◆ Prevention of oil spills during normal day-to-day business processes and operations is a priority strategy of the Sakhalin 1 Project;
- ◆ Timely mobilization of non-specialized and specialized internal resources of ENL and contractors for effective response to oil spills which occur as a result of ENL activity and, if necessary, mobilization of non-specialized and specialized resources and contractors from other production facilities;
- ◆ Immediate notification of RF state agencies of accidents and incidents at the facility;
- ◆ Immediate mobilization of specialized contractors for the oil spill response at the facility and from other ENL facilities;
- ◆ Protection of Areas of Special Value is given priority when responding to a spill.
- ◆ The use of the most appropriate technologies and tools (skimmer vessels, booms, mobile containers, absorbents, dispersants, incinerators, and other equipment) in coordination with the relevant agencies of the Russian Federation;
- ◆ The command and control system for oil spill response should be organized in accordance with the laws of the Russian Federation.
- ◆ Opportunities to improve oil spill response are studied constantly in collaboration with government and industry organizations to improve regional response forces and resources.

Wildlife Rescue and Rehabilitation following oil spills

The primary strategy for wildlife protection is controlling the spread of spilled oil to prevent or reduce contamination of potentially affected species and habitats. Removal of oiled debris and contaminated food sources also protects wildlife.

Only trained and experienced personnel may capture, transport, and rehabilitate oiled wildlife. In addition to the local area veterinarians, ornithologists, and representatives of the ENL environmental department who have trained to work with the ENL Wildlife Rehab kits and would provide the initial wildlife response capability, ExxonMobil can establish, if needed, contracts with two internationally-recognized oiled wildlife rescue and rehabilitation organizations: the International Bird Rescue Research Center and Tri-State Bird Rescue & Research, Inc.

If necessary, ENL may enlist the following Russian experts for rescue and rehabilitation of wild animals during oil spill response operations:

- ◆ Lomonosov Moscow State University

in Sakhalin Oblast:

- ◆ Ecoshelf LLC
- ◆ Environmental Company of Sakhalin.
- ◆ Veterinary service at Nogliki
- ◆ Veterinary Services and Livestock Breeding Agency of Sakhalin Oblast Ministry of Agriculture
- ◆ Veterinary Service of Yuzhno-Sakhalinsk;
- ◆ Fauna Information Research Center, 2013.
- ◆ Natural Sciences Institute (IEN) Sakhalin State University

In Khabarovsk Krai:

- ◆ Institute of Water and Environmental Problems, Far East Division, Russian Academy of Sciences, Khabarovsk
- ◆ Veterinary Department of the Khabarovsk Krai Government
- ◆ Bastak State Nature Preserve

After being notified, contractors and trained local specialists will mobilize special equipment and trained personnel to the spill area and begin wildlife rescue and rehabilitation operations.

- ◆ Reconnaissance survey, capture, and transportation of animals contaminated with oil,
- ◆ Stabilization and rehabilitation of animals contaminated with oil;
- ◆ Release of wild animals followed by tagging, monitoring, and tracking of the results of rehabilitation.

10. ENL Financial Risk Policy. Environmental Insurance

The obligations of the Sakhalin 1 Consortium in regard to compensation for damages are defined in Article 25 of the Production Sharing Agreement, which states that "the Consortium is responsible for actual damage or injury directly caused by the development of fields for which the Consortium is responsible under the applicable laws of the Russian Federation."

The Consortium provides and maintains kinds and amounts of insurance commensurate with reasonable risk management. Types of insurance may include, but are not limited to, insurance against loss of assets, loss of use of assets, loss of investment value, control of well and re-drilling expenses, pollution and seepage costs and liability, general third-party liability, and such other insurance as is consistent with good Oil and Gas Industry practice.

ENL annually enters into civil liability insurance contracts with SOGAZ JSC providing coverage against the risk of harm including to the life or health of people, the environment, the life or health of animals and plants, and cultural heritage sites of various ethnicities of the Russian Federation resulting from defects in construction work and engineering surveys or design documentation affecting the safety of capital construction facilities. Insurance contracts with a combined coverage limit of RUB 400 mln are currently in effect.

ENL annually enters into insurance contracts with SOGAZ JSC providing coverage against the company's liability for the harm to the life, health, and property of third parties and the environment resulting from accidents at hazardous industrial facilities operated by the company. Insurance contracts with a combined coverage limit of RUB 490 mln are currently in effect.

With a view to forming necessary provisions for natural and manmade emergencies containment and response efforts at Sakhalin-1 Project facilities, a special financial reserve for immediate response operations was created in November 2015.

In April 2016, an environmental civil liability insurance contract was signed providing coverage against the risk of harm to the environment, including aquatic resources, as well as the life, health, and property of third parties resulting from oil and petroleum product spills during the company's Sakhalin-1 Project operations, with a coverage limit of RUB 100 mln.

11. Energy Efficiency Improvements

Measures to ensure the energy efficiency of all buildings, structures and facilities of the Sakhalin-1 Project are developed at the planning stage and presented for state expert review as part of the relevant design packages.

In terms of the degree of power supply reliability, electrical loads of the Sakhalin-1 Project are subdivided into reliability categories and grouped by redundancy requirements, which rules out the installation of electric equipment with excessive power demand and prevents energy losses.

ENL is implementing the following electricity-saving measures at Sakhalin-1 Project sites:

- Indoor workplace lighting is provided by LED lamps and high-pressure sodium lamps with a higher luminous efficacy factor and a longer service life.
- Supply and distribution circuits are laid along optimal routes to minimize voltage losses.
- Phases are evenly loaded within each switchgear unit.
- Process flows have been optimized by using a scientifically calculated efficient pipeline diameter and installing software that controls the operating mode of electrical heat tracing of pipelines.
- High-efficiency electric motors are used.
- Power sources are installed centrally to electrical loads.
- Outdoor lighting is controlled by photocells that turn off the power supply in the daytime.
- Electric heat tracing of pipelines and equipment is controlled automatically depending on the ambient temperature.

Energy (primarily electricity) saving is ensured through the use of modern equipment, microprocessor-based process control systems, operating mode control software, and through state-of-the-art maintenance and repairs of primary and secondary equipment.

Sakhalin-1 Project sites have a self-contained power supply system. Facilities are supplied with electricity from gas-turbine and diesel generators. Fuel for gas turbines is produced directly at Sakhalin-1 Project sites.

Design documentation for Sakhalin – 1 facilities includes the chapter “Measures to ensure compliance with energy efficiency requirements and requirements for the equipment of buildings, structures and facilities with energy meters”. The chapter, as mandated by RF laws must be submitted for State Expert Review as part of design documentation.

Pursuant to the requirements of Federal Law #261-FZ “On Energy Saving and Improvements of Energy Efficiency and Amendments to Certain Legislative Acts of the Russian Federation”, ENL in 2012 conducted an energy inspection of the Company’s production facilities, the head office in Yuzhno-Sakhalinsk, the base camp in Nogliki and Olimpiya residential facility. Based on the results of the energy inspection, a report was compiled and the energy certificate developed. The certificate includes the following information:

- availability of equipment for metering the energy resources used ;
- amount of the energy resources used;
- indicators of energy efficiency;
- potential for energy saving, including an estimate of potential saving of energy resources in kind;
- a list of typical measures for energy saving and improvement of energy efficiency.

ENL’s energy use efficiency enhancement program is part of GREF activities. One of the key aspects of GREF’s operation is management of effective water use and power, including reductions in consumption of these resources, mitigation of the environmental impact, and curtailment of operational costs.

ENL’s GREF draws up an annual Environmental Business Plan, which allocates priorities and expectations for each business unit. Performance assessment is also done on an annual basis.

The methods used to improve energy use efficiency, among others, include:

- Level 1 power consumption audit, which includes regular review of the general configuration of the facilities, types and quality of energy systems used for the purpose of their refinement and optimization.
- Level 2 power audit used to assess and identify opportunities for energy saving by the available personnel using minimal resources;
- the KNOW YOUR ENERGY SOURCES program, which is expected to hone the understanding and control of all energy sources and of their utilization factor.

In addition, ENL’s GREF runs the `program, which is intended to remind employees, visitors, and partners to turn off the equipment and electric appliances when they are no longer in use. Another program is known as ENVIRONMENTALLY RESPONSIBLE USE OF OFFICE EQUIPMENT, which calls for environmentally responsible operation and maintenance of equipment and appliances.

In 2015 the overall power consumption in ENL offices in Yuzhno went down 40%, and 15% in the Moscow offices.

12. CONTRACTOR WORK MANAGEMENT REQUIREMENTS

Contractor's Responsibilities.

In accordance with the contracting procedure approved by ENL, which is included in tender document packages, contractors are required to develop an Environmental Protection Plan. The Plan should include solutions / programs for waste management and engagement of the relevant services, environmental, socioeconomic, and sanitation monitoring, prevention of water pollution, oil spill response, measures to comply with legal and regulatory requirements, assessment of impacts on environmental, socioeconomic, and sanitary conditions, and measures for their mitigation and elimination and should provide for training and appropriate reporting. These programs are reviewed and approved by ENL before starting work.

Each contractor will be required to identify and obtain all necessary permits, notifications, authorizations, approvals, licenses, and agreements with applicable stakeholders that are required to progress work and as agreed in the contractor's Regulatory Compliance Plan. The Plan is also submitted for careful review before the start of work and is approved by ENL.

In accordance with the terms of the contract, the Contractor must create a division responsible for compliance with environmental regulations, including the requirements of the Environmental Protection Plan covering the Contractor's scope of work.

Contractors should require that their subcontractors meet similar requirements, and in internal inspections each contractor must include data on the compliance of its subcontractors with environmental protection requirements in its reports.

Contractors are responsible for the proper training of their workers and the workers of subcontractors, as well as their awareness of current environmental and other legal/regulatory requirements and obligations and the environmental requirements for the Project.

Contractors shall periodically evaluate and adjust their Regulatory Compliance Plans and programs for management and monitoring of environmental and socioeconomic activities to ensure efficiency and to promote steady improvement.

Contractors are responsible for all legal/regulatory, environmental, socioeconomic, and sanitary aspects of their work, including work performed by their subcontractors.

Contractors shall ensure that their subcontractors have implemented Regulatory Compliance Plans and Environmental Protection Plans (including plans for waste management, spill prevention and response, social and economic activities, training, and monitoring), as well as the relevant procedures which are compliant with Contractor-approved Regulatory Compliance Plans and Procedures and the Environmental Protection Plan.

Interaction between the ENL Project Environmental Protection Team and Contractor

To ensure the appropriate level of organization of environmental protection activities and compliance indicators in the Environmental Protection Plan for the Project, ENL has put in place an effective process for exchanging information between the Project Team and contractors.

The ENL Environmental Protection Team performs the following functions:

- ◆ Oversee/monitor Contractor's management of the environmental aspects of its work activities on a regular, on-going basis

- ◆ Coordination of the interaction between the Contractor Team responsible for the execution of the Environmental Protection Plan and third parties with a relationship to the Project (the representatives of state agencies, private organizations, etc.).

Interaction of ENL personnel with specific state authorities does not relieve the Contractor of full responsibility for the implementation of its own regulatory compliance procedures and compliance with the relevant approval conditions.

The interaction between the ENL Environmental Protection Team and the Contractor Team responsible for the implementation of the Environmental Protection Plan includes the following:

- ◆ Causing contractors to implement the Environmental Protection Plan in a proper manner;
- ◆ Consultations regarding proposed change events as part of the Change Management Process;
- ◆ Submittal of proposed changes to the Environmental Protection Plan by the Contractor to the ENL Project Team for approval;
- ◆ Mandatory immediate communication with the ENL Project Team concerning failure to comply with environmental requirements;
- ◆ Mandatory immediate communication with the ENL Project Team concerning spills of hazardous substances;
- ◆ Mandatory transfer of information by the Contractor to the ENL Project Team on environmental monitoring, audits, and inspections conducted at the work sites;
- ◆ Weekly and monthly reporting by Contractor regarding environmental performance and statistical data

The ENL Environmental Protection Team will conduct periodic checks of Contractor work sites (including ships).

In the event of an environmental emergency, the Contractor shall forward a notice to the ENL Project Team immediately and take appropriate measures to respond to the emergency and eliminate its consequences.

13. INDUSTRIAL ENVIRONMENTAL CONTROL AND ENVIRONMENTAL MONITORING SYSTEM

ENL performs industrial environmental control at the Sakhalin 1 Project facilities and environmental monitoring in the areas of their environmental impact in accordance with the Sakhalin 1 Project Environmental Monitoring and Industrial Environmental Sanitary Control (EM & IESCP) Program, which has received a favorable state expert environmental review opinion. The EM & IESCP is an informational and measuring system which is implemented using technical, software, information and organizational means providing complete, on-line, reliable and comparable information about the environment.

Environmental monitoring practices during oil spill accidents are detailed in the Corporate Plan for prevention and response to oil and oil products spills for Exxon Neftegas Limited production facilities under the Sakhalin 1 Project, approved by the letter of Ministry of Emergencies of Russia (Letter No. 22-2-495 of April 10, 2012).

ENL strategy for environmental monitoring and in-process control

In compliance with current environmental protection laws, standards and regulations of the Russian Federation, and with due consideration of the applicable international conventions on environmental protection signed by the Russian Federation, and guided by agency regulatory documents, ENL has performed and continues to perform environmental studies and industrial environmental control during construction and operation of Sakhalin 1 production facilities.

Environmental studies, an environmental impact assessment, and industrial environmental control are integral components of environmental management:

The essence of the in-process environmental control and environmental monitoring concept is as follows:

- ◆ Environmental surveys, including determination of baseline environmental indices, will be performed during the pre-construction phase;
- ◆ A detailed environmental impact assessment will be performed using the results of environmental studies by ENL at the project site and the results of environmental monitoring and industrial control at active Sakhalin 1 facilities; the intensity, duration and spatial dimensions of zones of potential impact on elements of the environment will be determined for different phases of project implementation;
- ◆ Based on the results of the impact assessment, an Environmental Monitoring and In-Process Control Program for the construction and operation phases is developed;
- ◆ Programs for study of individual elements of the environment and study and protection of vulnerable species will be developed and implemented;
- ◆ Compliance of production operations with the environmental laws and implementation of environmental protection measures will be monitored, and records will be kept of the use of natural resources;
- ◆ The environmental monitoring and industrial control program include monitoring of the actual environmental impact of commercial activities;
- ◆ The monitoring results will be used for operational management in planning production activities.

Goals and Objectives of Environmental Monitoring and Industrial Environmental Control

The goals of environmental monitoring and industrial control are to:

- ◆ Ensure compliance with environmental standards and implement measures for environmental protection and sustainable use and renewal of natural resources;
- ◆ Compliance with environmental requirements prescribed by the laws of the Russian Federation;
- ◆ Implementation of the Company's environmental protection policy;
- ◆ Ensuring that the environmental information is comprehensive, provided on time, and reliable.

The principal objectives of environmental monitoring and industrial control are to:

- ◆ Monitor implementation of environmental protection measures, instructions, and recommendations of specially authorized government agencies in the field of environmental protection;
- ◆ Enforce the prescribed standards and rules for handling hazardous wastes and materials;
- ◆ Monitor sustainable utilization of natural resources and keep records of their use;
- ◆ Monitor the state of elements of the environment in the facility impact zone;
- ◆ Observe hazardous natural processes that affect project facilities and predict the development of monitored indices of these processes;
- ◆ Maintain the facility's environmental documentation;
- ◆ Submit the information specified by the Company's environmental management system in a timely manner;
- ◆ Submit in a timely manner the information included in government statistical reports and other reports submitted to government regulators and oversight agencies of the Russian Federation.

Stages of environmental monitoring

Environmental monitoring of the Sakhalin 1 Project facilities is done in three stages:

- ◆ Baseline monitoring (pre-construction);
- ◆ Local environmental monitoring and industrial environmental control at the construction stage (construction monitoring);
- ◆ Local environmental monitoring and industrial environmental control at the stage of operation (operational monitoring).

Pre-construction monitoring involves an appraisal of the status of environmental components in the projected zones of project facilities prior to the start of construction work. The data thus obtained are subsequently used as inputs for the evaluation of the environmental impact of Sakhalin 1 Project facilities in the course of their construction and operation.

The construction monitoring stage involves industrial control of environmental impact and environmental status monitoring during construction of the facilities.

Operational monitoring begins as the facilities go on stream. The stage of operational monitoring involves industrial environmental monitoring of the impact on the environment and environmental status monitoring during operation of the facilities.

Management of in-process environmental control and environmental monitoring.

The environmental monitoring and industrial environmental and sanitary control system is divided into the following functional subsystems:

- ◆ Data measurement;
- ◆ Data transmission;
- ◆ Data management.

The environmental observations combine two systems: monitoring the sources of environmental impact and monitoring the condition of the environment. The system for monitoring the sources of environmental impact records emissions, discharges, levels of physical impact, and the volumes and movement of production and consumption waste. Monitoring of the condition of the environment includes measurement of parameters of the air, surface water bodies and groundwater, the geological environment, soil cover, vegetation, aquatic biota and terrestrial wildlife.

ENL performs the following field studies:

<u>Atmospheric emission monitoring</u> Sampling of atmospheric emissions Measurement of Gas-air Mixture Parameters Measuring Pollutant Concentrations
<u>Atmospheric air and work area air:</u> Sampling to Determine Pollutant Content Measuring Pollutant Concentrations
<u>Monitoring of wastewater discharge and the quality of surface and subsurface water:</u> Water sampling to Determine Pollutant Concentrations

<u>Physical impact factor monitoring:</u> Noise Measurement Electromagnetic Field Measurement Vibration Measurements
<u>Monitoring of geological processes:</u> Observations of Exogenous Geological Processes
<u>Soil conditions control:</u> Soil Sampling
<u>Monitoring of vegetation status</u> Field Material Collection Organization of permanent test site network Work at base sites
<u>Control of wildlife conditions</u> Monitoring of wildlife species specified in the monitoring program

Properly accredited and certified Russian laboratories will be enlisted for laboratory work. All laboratory studies shall be conducted in accordance with existing Russian methods included in the State List of Quantitative Chemical Analysis Methods and the Federal List of Methods for Carrying out Measurements Allowed for Use in Performing Environmental Pollution Monitoring, and RF Ministry of Health methods.

This environmental monitoring program will make it possible to monitor the quality of the natural environment during implementation of the Project. Using the monitoring findings, ENL and its contractors will take adequate and timely measures to mitigate environmental impacts. The information acquired in the environmental monitoring process will be duly conveyed to Russian governmental authorities.

14. PUBLIC AWARENESS OF PROJECT PROGRESS

The public will be kept informed throughout the Sakhalin 1 Project period

Data transmission equipment;

Form	Where	When	Objective
Mass media (newspapers, television, radio)	The entire island and the relevant part of the Russian mainland	On a regular basis	Provide specific information on the project, give notice of meetings and open door days, and determine public opinion
Visual Aids	Open door days, seminars and conferences, special libraries	On a regular basis	Provision of information
Posters, brochures, flyers, reports,	Open door days, seminars and conferences, special libraries, and additional dissemination of information by request	On a regular basis	Provision of information

Form	Where	When	Objective
Video, photographs, maps, charts	Meetings, seminars, open door days	On a regular basis	Provision of information
Direct communication	Yuzhno-Sakhalinsk; whole island	On a regular basis	Provision of information
Website:	On an international scale	On a regular basis	Provision of information

ENL conducts public consultations on EIA materials and promotes public participation in the process of assessing the environmental impact of the project, providing the opportunity to express opinions on the key issues related to this process.

A notice advising of public consultations is published in Federal and Oblast papers, such as Sakhalinsky Neftyanik (the city of Okha), Znamya truda (the village of Nogliki) Gubernskiye Vedomosti (Yuzhno-Sakhalinsk) Rossiyskaya Gazeta. The EIA technical assignment and preliminary materials are made available to the public for review at local libraries.

Concerned citizens and public organizations may comment on EIA materials during public consultations, as well as by hot line telephone and other duplex communication channels.

The public comments and suggestions are taken under advisement and integrated into the EIA materials submitted as part of the submittal package for State expert review.

Public Consultation Communication Methods

Form	Where held	Objective
Interview / focus groups	Yuzhno-Sakhalinsk, Kholmsk, Nogliki, Okha, Bogorodskoe	Environmental protection policies;
	Yuzhno-Sakhalinsk, Kholmsk, Nogliki, Val, Okha	Study of environmental protection issues and updating of EIA
Public Opinion Survey	Yuzhno-Sakhalinsk, Kholmsk, Korsakov, Aleksandrovsk-Sakhalinski, Nogliki, Okha and Dolinsk	Determination of baseline data
	Yuzhno-Sakhalinsk, Kholmsk, Okha, Val, Nogliki, DeKastri	Determination and comparison of baseline data
Public opinion exit poll	Yuzhno-Sakhalinsk, Kholmsk, Val, Nogliki, Okha, DeKastri,	Collection of additional information
	Yuzhno-Sakhalinsk, Kholmsk, Val, Nogliki, Okha, DeKastri,	Collection of additional information
Stakeholder workshops	Yuzhno-Sakhalinsk, Kholmsk	Exchange of information and determination of public opinion
	YUZHNO-SAKHALINSK	Exchange of information and determination of public opinion
Open Door Sessions	Yuzhno-Sakhalinsk, Kholmsk, Val, Nogliki, Okha, DeKastri,	Exchange of information and determination of public opinion

Form	Where held	Objective
Books with the documentation and comments in public (city, town) libraries	Yuzhno-Sakhalinsk, Kholmsk, Korsakov, Val, Nogliki, Okha, DeKastri, Nikolaevsk-na-Amure	Exchange of information and determination of public opinion

ENL promotes regular meetings with a wide range of parties affected by the project. Meetings with regional and local authorities are an important component of the system for project management and addressing of regulatory issues. Representatives of regional and local government bodies are involved in determining the issues to be discussed with the public at open door days, seminars, and other events.

ENL recognizes the importance of public participation in the discussion of issues related to the project. ENL employees participate in numerous community events and intend to continue this interaction with the public on Sakhalin Island and in Khabarovsk Krai and to arrange presentations and events for schools, environmental groups, local government, business groups, and community organizations.

15. ENVIRONMENTAL OFFICE PROGRAM

ENL GREF draws up annual Environmental Business Plan, which lays out fundamental strategic principles and long term plans for environmental protection. GREF was created to lead company employees, clients, contractors and other organizations and individuals involved in environmental protection. The environmental business plan lists priorities and routine tasks for each of the company's business units each year. Their performance in achieving the objectives is also rated on an annual basis.

The key focus areas for ENL's GREF include:

- 1 – strict compliance with RF environmental laws, assessment and management of potential risks;
- 2 – cascading to employees in the field of the environmental protection requirements and the company's programs for waste reduction and prudent consumption of water and power. Employees' responsible awareness, enhanced involvement and participation by contractor personnel and the employees of recruiting and service companies, the understanding of the need to soften the environmental impact.
- 3 – waste management including development and implementation of measures to minimize waste generation, to re-use and recycle waste;
- 4 – sensible water and power use management, including reduced consumption ;
- 5 – setting up, development and expansion of natural complexes at Sakhalin-1 facilities, participation in strategic partnership programs to conserve nature and promote biodiversity ;
- 6 – setting up, development, and expansion of Sakhalin-1 "green" facilities, including creation of environmental responsibility culture and ensuring of personnel's sound health and safety.

Environmental protection program implementation relies on documented corporate programs and on environmental protection initiatives coming from company employees, contractors, clients and other stake holders among organizations and individuals.

Corporate environmental protection programs

- “Enhance personnel involvement” through heightening field personnel and contractor awareness of the need to take stock of their behavior and to replace habitual behavior with environmentally safe actions ;
- “Remember the switch” drive is intended to induce employees, contractors, visitors and partners to turn off the equipment and appliances which are no longer in use to save electricity and to heighten the feeling of being involved and of responsibility for the facility environmental stability;
- “Environmentally responsible use of office equipment” is a drive which ensures safe and environmentally responsible operation of equipment and appliances which consume materials, water, and power ;
- “Power consumption audits” call for regular reviews of the general configuration of facilities, type and quality of power systems used – for the purpose of their optimization and improvement, they are also used to assess and identify opportunities to save power by the local personnel, drawing on minimal resources;
- “Effective cups” is a drive to encourage employees, visitors, and partners to refrain from using disposable tableware to minimize waste ;
- “Tame the paper tiger” is a drive to reduce [urchases and use of paper ;
- “Eliminate construction trash” is an initiative to reduce trash and debris, to fine-tune trash segregation, to recruit local waste management companies;
- “Report leaks and stay aware of your responsibility” promotes company peronnel and contractor in detecting and timely reporting of water leaks;
- “Creation of effective comfort zone” is a drive to create an attractive and comfortable ambience and to optimize the local ecosystem outside of the office building, etc.

The effect of the Green Office Program, 2015	
Efficiency indicator	Value
Lower power consumption	40 %
Lower water consumption	14 %
Waste reduction	30 %
Fewer disposable cups used	51 %
Wider biodiversity around the office buildings	60 %
Office paper reduction	ongoing
Creation of a page on the internal site to publish office’s environmental performance	2015