



THE CASPIAN SEA

The Caspian Sea is the largest landlocked drainless water body in the world. It is a lake by definition, but due to its size and bed resembling an ocean bed, the Caspian is traditionally called a sea.

The Caspian Sea, along with the Black Sea, used to form a part of the single Sarmatian Sea that split about a million years ago. The name 'Caspian' is derived from an ancient tribe of Caspians that populated its coastal area before the current era. The sea was previously called differently, i.e. the Girkanian Sea, the Khazar Sea, the Khvalynian Sea.

The Caspian Sea is located at the border of two continents, Europe and Asia. In physical and geographical terms, the sea is divided into three parts, i. e. the North Caspian, the Middle Caspian and the South Caspian. The Caspian coasts along the major part of its offshore area are low-lying and plain.

	320	average width km
	1 200	average length km
	7 000	coastline length km
	1 025	maximum depth m
	371	offshore area thousand km ²
	12.7	average salinity ‰
	5	number of littoral states

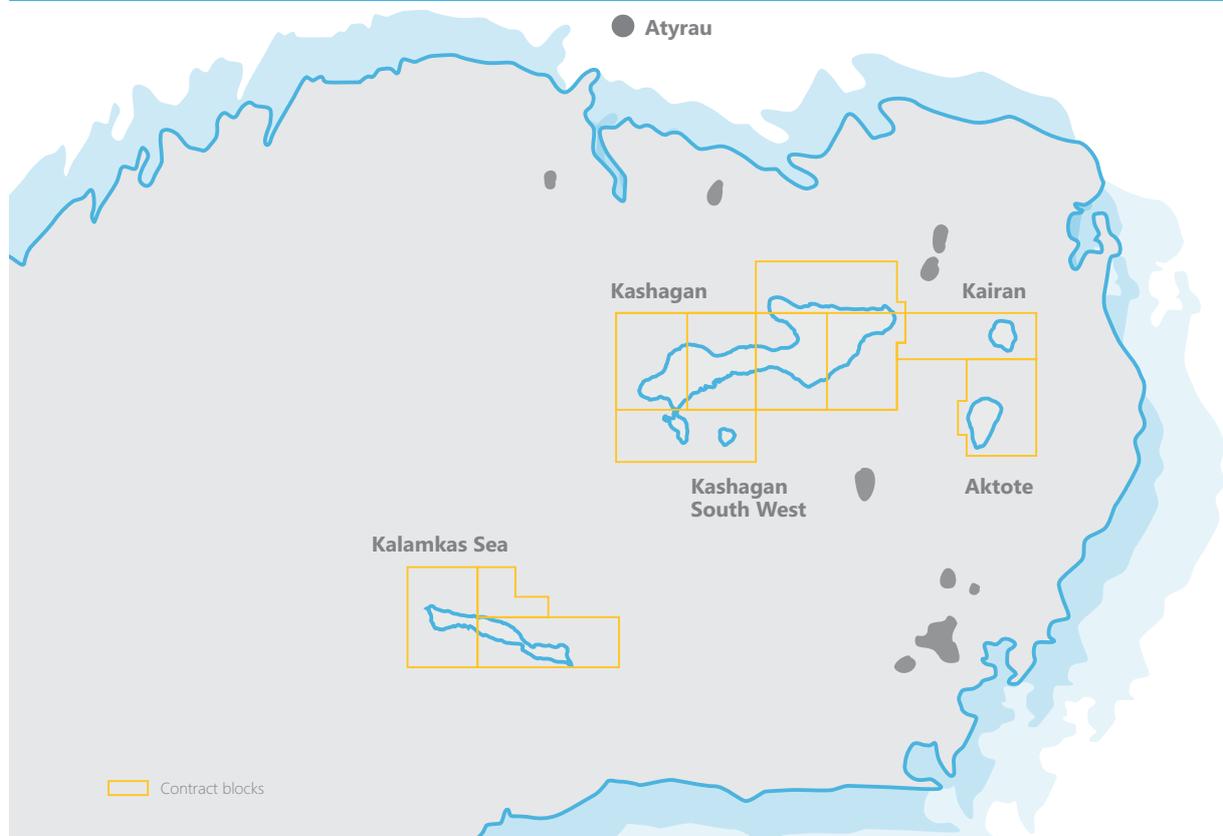
1. ABOUT THE NORTH CASPIAN PROJECT

1.1. PROJECT DESCRIPTION

The North Caspian Project is the first major offshore oil and gas development in Kazakhstan. It covers five fields: Kashagan, Kalamkas-Sea, Kairan, Aktote and Kashagan South West.

The giant Kashagan field ranks as one of the largest oil discoveries of the past four decades, with approximately 9-13 billion barrels (1-2 billion tonnes) of recoverable oil. The Kashagan reservoir lays 80 km offshore the city of Atyrau in 3-4 m of water, and more than 4 km deep (4200 m).

The combined safety, engineering and logistics challenges in a harsh offshore environment make Kashagan Phase 1 one of the largest and most complex industrial projects ever developed.



NCSPSA contract area

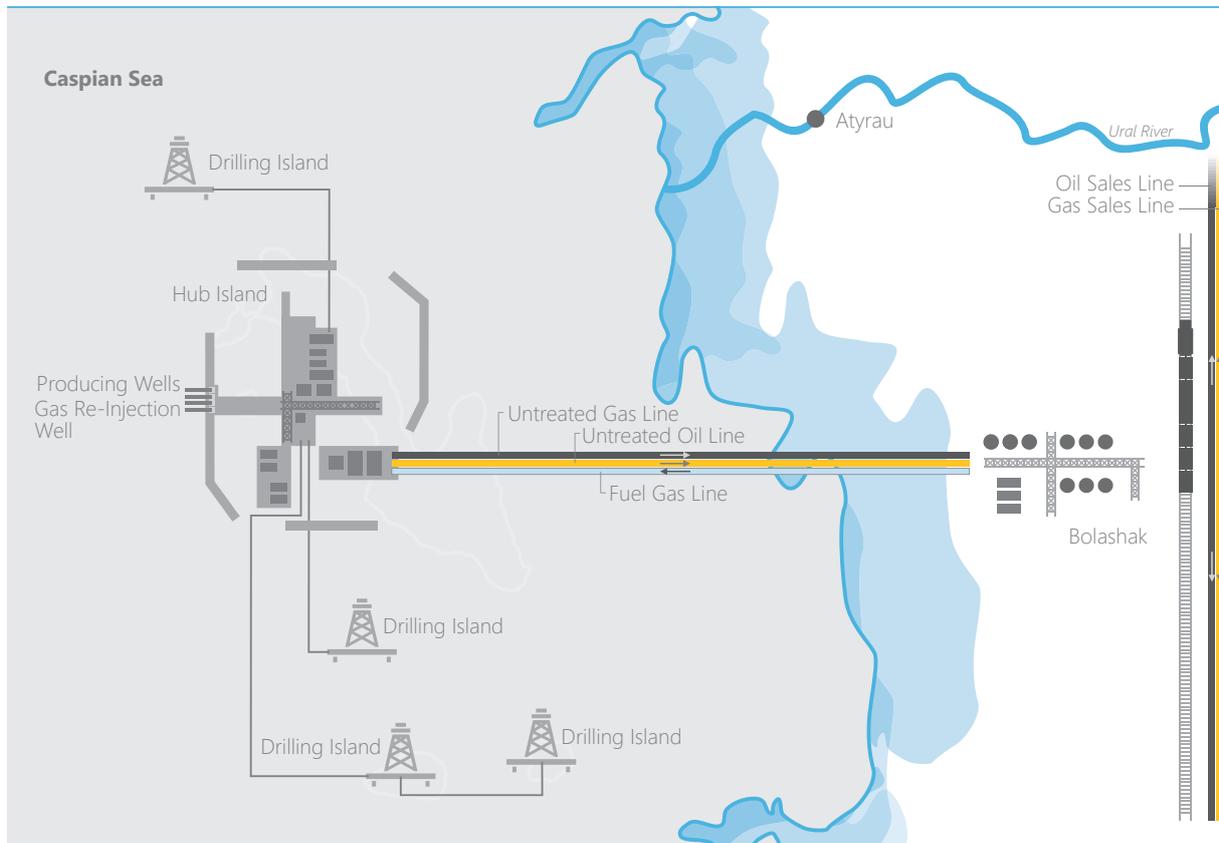
Sour Gas Reinjection

The fluid being produced from Kashagan is a mix of hydrocarbons: light, gaseous components such as methane, ethane, carbon dioxide, and hydrogen sulfide, and heavier petroleum components. Kashagan as a reservoir is characterized by high pressure (more than 700 bar), and a high concentration of hydrogen sulfide (H₂S), making the gas "sour." Sour gas is treated to remove the H₂S and this process produces elemental sulfur. The amount of oil we can produce is limited by the amount of sour gas we can process.

A positive feature at Kashagan is that sour gas at these high pressures, when re-injected, can actually enhance oil recovery. Thus sour gas re-injection is an optimal solution from both an environmental and production standpoint, allowing us to increase Kashagan's oil recovery ratio while minimizing sulfur production. The light, gaseous components are separated from the heavier oil offshore on D Island and about half of it may be re-injected under high pressure back into the reservoir, into the same rock formation from which it is produced. The remainder of the gas is sent to the Bolashak Onshore Processing Facility where hydrogen sulfide is removed from the "sour" gas. Some of the processed, or "sweetened", gas is used for onshore and offshore power generation, and some is marketed as Sales Gas.

Phased Development

Given its scale and technical complexity, the North Caspian Project is being developed in phases. Kashagan Phase 1 is the first, with an estimated cost of about US\$55 billion. Commercial production began in 2016. In 2017, early engineering and design work continued toward potential future expansion



Kashagan Development Concept



More Information

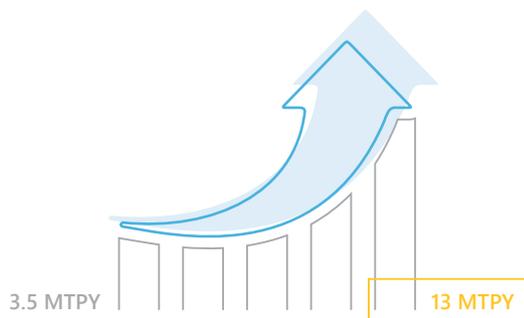
More about NCOC's Kashagan Phase 1 Project can be found on our website at www.ncoc.kz, please see page 234 (1).

of Phase 1 production. NCOC also continued to progress its idea for the potential co-development of its Kalamkas-Sea field and CMOC's nearby Khazar field in a future Phase. We hope that the cost savings that can be achieved by the joint development of these fields will make their development economically viable.

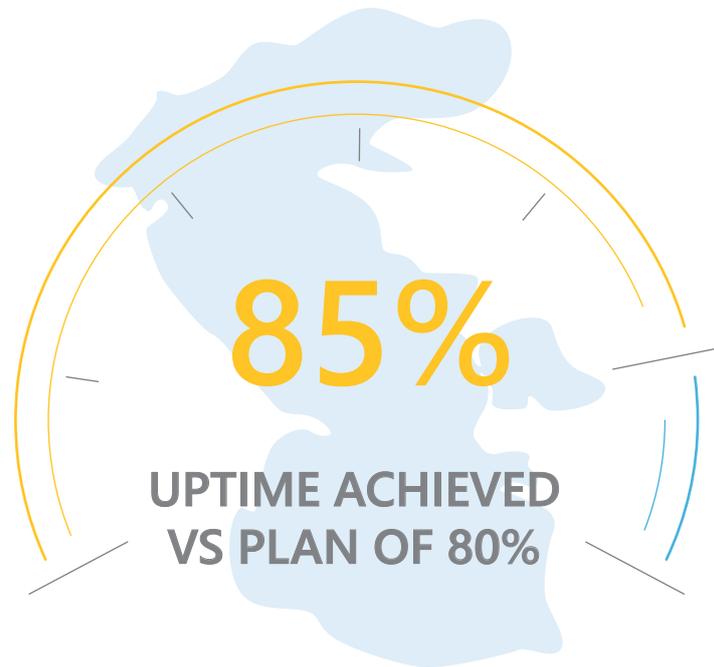
Development of other fields is still in the assessment phase.

1.2. 2017 ACTIVITIES

After start-up in 2016, production quickly and safely ramped up in early 2017 to the first target capacity level of 180,000 barrels per day. The safe and timely start-up of sour (or "raw") gas reinjection in mid-August was our most important technical achievement of 2017, allowing us to gradually increase and optimize the amount of gas being re-injected so that more oil can now be produced from Kashagan. We reached a capacity of 270,000 barrels per day (about 13 million tonnes per year) by year-end 2017, with the ramp-up to 370,000 barrels per day extending into 2018 (see Near Term Outlook below). Our approach has been a sequence of steady and planned steps to build confidence in our equipment, processes, and the reaction of the reservoir – with safety, as always, our first priority.



2017 production ramp-up



Production reliability has met or exceeded expectations, thus keeping flaring to a minimum, in accordance with RoK legislation.

In 2017 we continued to bring on-line new wells and to commission additional drilling islands adjacent to D Island (EPC-2, 3 and 4).

Another important achievement was the start-up of additional water processing capacity at Bolashak OPF, which has increased our industrial water recycling and allowed us to halve the amount of fresh water withdrawal from the pipeline that serves Atyrau and Mangystau oblasts.

NCOC completed work on the dedicated rail loading facility at Eskene West and began export of commodity sulfur with the dispatch of a first train of sixty rail cars on October 28, 2017.

Near-Term Outlook

With the start of gas re-injection in August 2017 we have learned a great deal about how the Kashagan reservoir is reacting. Pressure decline, and hence production increase, is more gradual than originally expected. The Operator remains dedicated to reaching full design capacity of 370,000 barrels per day at the earliest possible date. NCOC is studying options to accelerate this timing.

1.3. EXPORT OPTIONS

Since mid-November 2017 all oil is exported via the Caspian Pipeline Consortium's newly-expanded Atyrau-Novorossiysk pipeline. Before that time, some volumes have been also exported northbound through Atyrau-Samara (connection to Russian Transneft system).



Crude Oil Export Routes

There is also other eastbound route via Atyrau-Alashankou pipeline, not currently used by Contracting Companies.

Sales gas is shipped through a dedicated pipeline to Makat and then onward via KazTransGas infrastructure. Sulfur is being shipped by rail.

Each shareholder is independently responsible for transporting and marketing its own share of production.

Sulfur Export

Sulfur quickly became a regular export product of NCOC in the fourth quarter, with 109,000 tonnes dispatched in a little more than two months. By the end of 2017, trains were being dispatched at a rate of almost three per week.

Sulfur is exported in the form of small granules or pellets, called "pastilles," to prevent dust generation. The finished sulfur pastilles are carried by conveyor belts and may be stored or loaded directly into rail cars. As they are filled, the rail cars are covered with a special protective covering. Then they are weighed and cleared through customs and made ready for export from Karabatan Station. After passing all required authorizations, NCOC transfers custody of the train at Karabatan Station to the seller of the sulfur, who is one of NCOC's shareholders. The pastilled sulfur is exported to either Ust-Luga (a port on the Baltic Sea near St Petersburg, Russia) or to Kavkaz (a port on the Sea of Azov in Krasnodar Kray, Russia). When the facility reaches full design capacity, it will produce up to 1.1 million tonnes of sulfur pastilles per year (about 4500 tonnes of sulfur per day). As noted by Alibek Tassimov, Onshore Sulfur Facility Manager, "We always focus on safety during sulfur production, loading and preparation to export, transportation and storage".





1.4. NCOC GOVERNANCE AND MANAGEMENT SYSTEMS

The North Caspian Project is developed under the North Caspian Sea Production Sharing Agreement (NCSPSA), signed by the Republic of Kazakhstan and an international consortium of major oil and gas companies in 1997.

Today, exactly twenty years later, that consortium includes seven of the world's largest and most experienced energy companies: KazMunaiGas, Eni, Shell, ExxonMobil, Total, CNPC and Inpex. Each shareholder is independently responsible for transporting and marketing its own share of production, and for reporting and sharing that production with the government according to the NCSPSA.



Shareholders

The Project is managed by an Operator, acting on behalf of the shareholders. Prior to 2015, the North Caspian Project was operated under a model in which the Operator delegated certain development and production activities to four "agent" companies. In late 2014 the shareholders agreed to further integrate and consolidate management with the creation of unified Operator North Caspian Operating Company N.V. (NCOC) ¹. The top executive officer of NCOC is the Managing Director.

¹ Here and elsewhere in this document the abbreviation NCOC refers only to North Caspian Operating Company N.V. The term Operator may refer to NCOC, or to any of the previous Operators under the NCSPSA, as appropriate in context.

CASPIAN SEA LEVEL FLUCTUATIONS

The Caspian Sea Level is variable. According to historical and archaeological data, it was high in the early 14th century, for instance. The range of the Caspian Sea Level fluctuations is 15 m. Accurate instrumental measurements and systematic observations focused on these fluctuations started in 1837.

In the industrialisation period in the first half of the 20th century, due to large-scale construction of water power plants on the Volga River and intensive water intake for agricultural purposes from rivers flowing into the Caspian Sea, scientists raised the alarm. They believed that the sea shallowing was a man-caused phenomenon. However, subsequent observations showed that the impact of human economic activity on the Caspian Sea Level, if any, is not as significant as expected. This fact became evident when it was found out that the sea water level did not fall at the expected rate; moreover, at a certain point it even started to rise.

The fluctuating level of the largest landlocked water body in the world is currently explained by a range of factors. The climatic factor is quite significant as the Caspian water losses due to evaporation exceed the total river water inflow. Thus, the global warming that causes deglaciation and world ocean level rise has an opposite impact on the Caspian Sea. The geological factor shall also be taken into account. However, all these factors are not completely understood yet, so no accurate explanation may currently be given for such drastic Caspian Sea Level fluctuations.

	15	fluctuation range for 3000 years m
	360	annual evaporation km³
	60	Annual gain due to precipitation km³
	300	average annual river water inflow km³



2. NCOC PERFORMANCE DATA

	2015	2016	2017
PRODUCTS			
Oil Production (wellhead, million tonnes)	0	0.96	8.29
Gas Production (wellhead, billion standard cubic meters)	0	0.59	4.80
• Of which reinjected (billion standard cubic meters)	0	0	0.32
Sulfur Production Exported (thousand tonnes)	0	0	109
• Sulfur in block storage, year-end (thousand tonnes)	0	120	1121
HEALTH AND SAFETY			
Occupational injury and illness			
• Total Recordable Injury Rate (TRIR), per million man-hours	0.79	0.81	0.60
<i>NCOC Employees</i>	<i>0.50</i>	<i>0.86</i>	<i>0.76</i>
<i>Contractors</i>	<i>0.88</i>	<i>0.80</i>	<i>0.55</i>
• Lost Time Injury Frequency (LTIF), per million man-hours	0.30	0.29	0.32
<i>NCOC Employees</i>	<i>0.34</i>	<i>0.57</i>	<i>0.30</i>
<i>Contractors</i>	<i>0.26</i>	<i>0.22</i>	<i>0.33</i>
• Fatalities	0	0	0
• Fatal Accident Rate, per million man-hours	0	0	0
• Fatal Incident Rate, per million man-hours	0	0	0
Number of Process Safety Tier 1 Events (per API RP 754) ²	0	0	3
Number of Process safety Tier 2 Events (per API RP 7542) ²	0	1	11

² API RP 754 is American Petroleum Institute Recommended Practice 754, which classifies process safety indicators for the petrochemical and refining industry into four tiers. Tiers 1 and 2 are considered suitable for public reporting. See <http://www.api.org/oil-and-natural-gas/health-and-safety/process-safety/process-safety-standards/rp-754>

	2015	2016	2017
ENVIRONMENT			
Greenhouse Gas Emissions			
• Direct (Scope 1), thousand CO ₂ -equivalent tonnes ³	465.0	1395	2974
Carbon dioxide (CO ₂), thousand tonnes	461.5	1384	2852
Methane (CH ₄), thousand CO ₂ -equivalent tonnes	1.0	6.2	115
Nitrous oxide (N ₂ O), thousand CO ₂ -equivalent tonnes	2.5	4.7	6.7
• Indirect (Scope 2, imported energy), thousand CO ₂ -equivalent tonnes ⁴	10.1	10.3	10.2
• GHG intensity, CO ₂ -equivalent tonnes per 1000 equivalent tonnes of oil produced ⁵	N/A	N/A	237

³ The Global Warming Potential multipliers used to calculate CO₂ equivalence are 21 for CH₄ and 310 for N₂O, using 100-year time horizons, based on RoK Ministry of Environmental Protection Order № 280-е(р) of 5 Nov 2010 "Об утверждении отдельных методик по расчету выбросов парниковых газов." Emissions are calculated at the facility level based on approved methodologies and requirements established by the RoK Environmental Code and applicable regulation, and consistent with the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

⁴ Calculated from indirect electricity consumption using a demand-side emission factor of 0.998 tCO₂/MWh for Kazakhstan grid (combined margin) in 2017, per "Методика расчёта коэффициента выбросов для электроэнергетических систем," Kazakh Scientific Research Institute of Ecology and Climate of RoK Ministry of Environment (2012), based on the EBRD methodology in the Appendix (Lahmeyer International, 2012), available from the KazEnergy GHG standards website.

⁵ The normalization factor for intensity figures in 2017 is 12.61 million tonnes oil equivalent (TOE). This is calculated from the total wellhead production of crude oil, dry gas and natural gas liquids (including flared gas and gas used for fuel but excluding gas reinjected into the reservoir) in TOE, according to "Recommended normalization factors for environmental performance data" in 3rd edition (2015) of IPIECA "Oil and Gas Industry Guidance on Voluntary Sustainability Reporting," p.37. Physical tonnes of crude oil are converted to TOE by multiplying 1.018 TOE/tonne oil. Physical volumes of associated gas are converted to TOE by multiplying 0.932 TOE/000 Sm³. The conversion factors are specified in Appendix 2 of the Order of the Chairman of the Statistics Committee of the RoK Ministry of National Economy № 160 of 11 August 2016 "Методики по формированию топливно-энергетического баланса и расчету отдельных статистических показателей, характеризующих отрасль энергетики."

	2015	2016	2017
Energy Use			
• Total, million gigajoules (GJ) ⁶	10.6	14.0	29.8
• Energy intensity, GJ per million equivalent tonne of oil produced	N/A	N/A	2.36
• Total energy exported (imported) by NCOC, million GJ	(0.1)	(0.11)	(0.12)
Hydrocarbon Flaring, standard ⁷ million cubic meters	6.3	129	104
Fresh water			
• Total volume withdrawn, thousand cubic meters	384	1014	1148
• Total generated from seawater, thousand cubic meters	106	112	21
• Total volume consumed, thousand cubic meters	444	1126	1169
• Freshwater intensity, tonnes of water consumed per 1000 equivalent tonnes of oil produced	N/A	N/A	93
Controlled Discharge to Surface Water			
• Hydrocarbons, metric tonnes	0	0	0
Air emissions			
• Volatile organic compounds (VOCs) emitted, metric tonnes	395	637	608
• Sulfur dioxide (SO _x) emitted, metric tonnes	131	56,408	41,717
• Nitrogen oxides (NO _x) emitted, metric tonnes	943	1430	2874
Spills to the environment			
• Number of spills >1 bbl reaching environment	0	0	0
• Volume of hydrocarbons (oil) spilled, metric tonnes	0	0	0

⁶ 1 megawatt-hour (MWh) = 3.6 gigajoules (GJ).

⁷ Standard cubic meter at 20°C and pressure 1 atm. The format for reporting amounts flared is established in RoK Government Decree № 1104 of 16 October 2014.

	2015	2016	2017
Waste			
• Total quantity of waste disposed, metric tonnes	22,523	23,205	26,353
• Of which classified as hazardous by local regulation, metric tonnes	19,882	12,090	17,310
SOCIO-ECONOMIC			
Nationalization of NCOC Workforce⁸			
• Percentage of national employees in management	63	69	75
• Percentage of national employees in technical and engineering positions	95	96	97
• Percentage of national employees in worker and support positions	100	100	100
Composition of NCOC Workforce, percent women employees	33	33	32
Cumulative number of Kazakhstan citizens receiving NCOC-sponsored training, thousands	15	15	16
Cumulative value of intensive job-related training for NCOC employees who are Kazakhstan citizens, million U.S. dollars	250	255	260
Cumulative payments to local suppliers for goods, works and services ⁹ , billion U.S. dollars	12.6	13.3	13.7
Cumulative direct contribution to social infrastructure and community donations, in Atyrau and Mangystau Oblasts, million U.S. dollars	500	526.5	571.4

⁸ Employees of NCOC N.V. only. "Management" corresponds to NCSPSA categories 1 and 2, "technical and engineering" to NCSPSA categories 3 and 4, and "worker and support" to NCSPSA category 5.

⁹ Local goods, works and services are defined per the Unified Methodology on local content calculations, defined in the 2010 RoK Law "On Subsurface and Subsurface Use." See Link to Subsoil Act definitions of local content used by NCOC at www.ncoc.kz / BEYOND OIL AND GAS / LOCAL CONTENT / LOCAL CONTENT POLICY

CASPIAN CLIMATE AND WATER TEMPERATURE

The climate is moderately and extremely continental in the north part of the Caspian and subtropical in the south-west part, while the east coast is predominated by desert continental climate common for Central Asia. Generally, the annual water temperature range in shallow areas may reach 25 to 26 °C. The air temperature becomes more stable in summer, ranging from +24 to +26 °C. Winters are much more severe along the entire east coast.

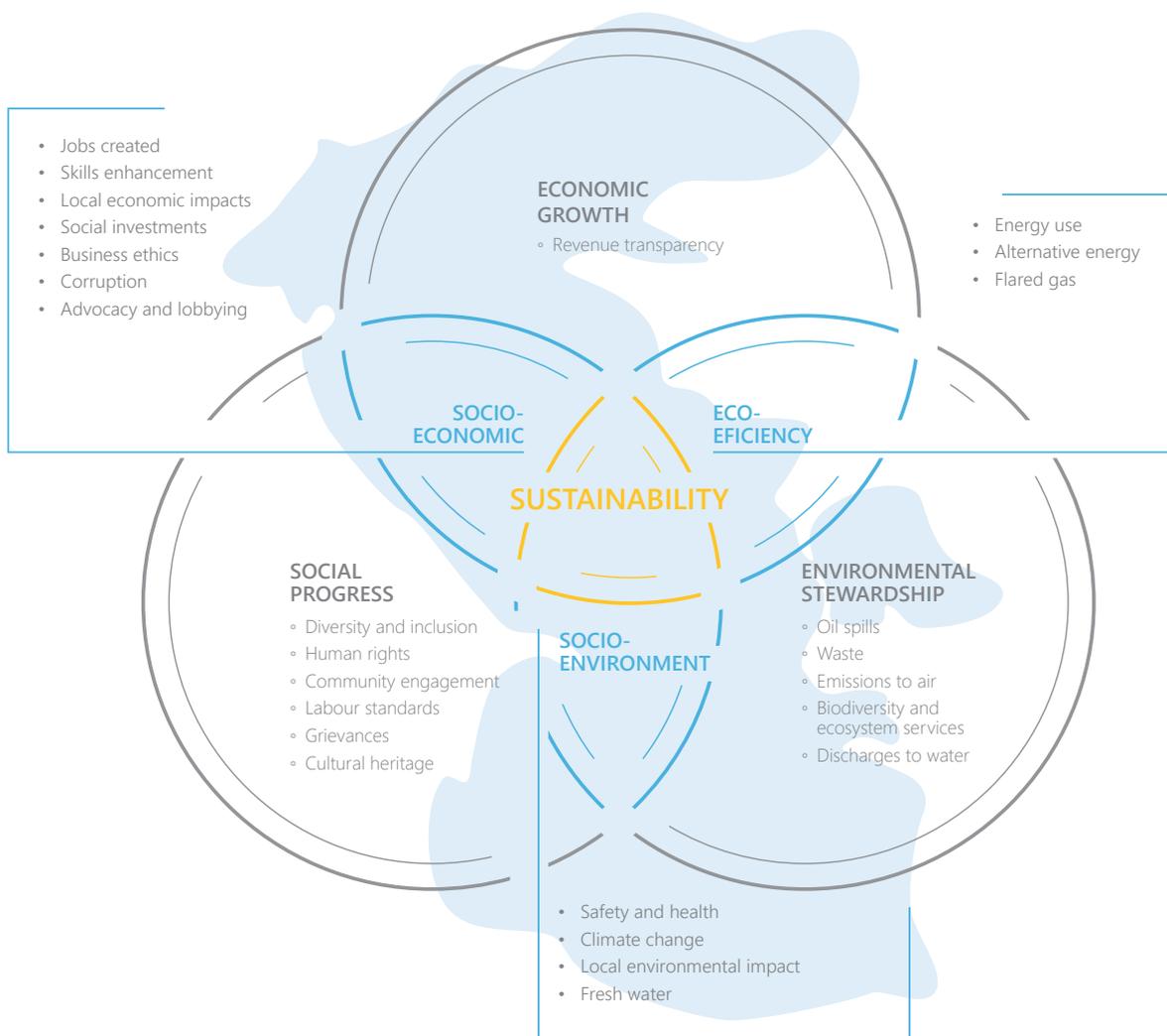
Kazakhstan owns a part of north and east coastal areas of the North and Middle Caspian. The border between these conventional areas passes from the Tupkaragan Cape (Kazakhstan) to the Chechen Island (Russia). The climate in the Kazakhstan Caspian coastal area is very harsh. Ice covers the shallow north part of the sea in winter, while exhausting desert heat predominates in the area in summer.

 26	annual water temperature range °C
 -38	absolute minimum air temperature °C
 +45	absolute maximum air temperature °C



3. REPORT STRUCTURE

Narrative reports on NCOC performance are divided into six key aspects of sustainability, as shown graphically below. This manifests our concept of sustainability as the integration of economic, social and environmental concerns. Each of the aspects has narrative descriptions, putting results in context with explanation, and occasionally providing a case study to illustrate progress toward goals. The topics covered are determined by “common” reporting requirements of the IPECA guidelines (3rd ed., 2015) and our analysis of issue materiality. See the section “Reporting Process” for more detail.



4. SOCIO-ENVIRONMENT

4.1. HEALTH AND SAFETY

Health and safety is a core value at NCOC.

Policies, plans and programmes

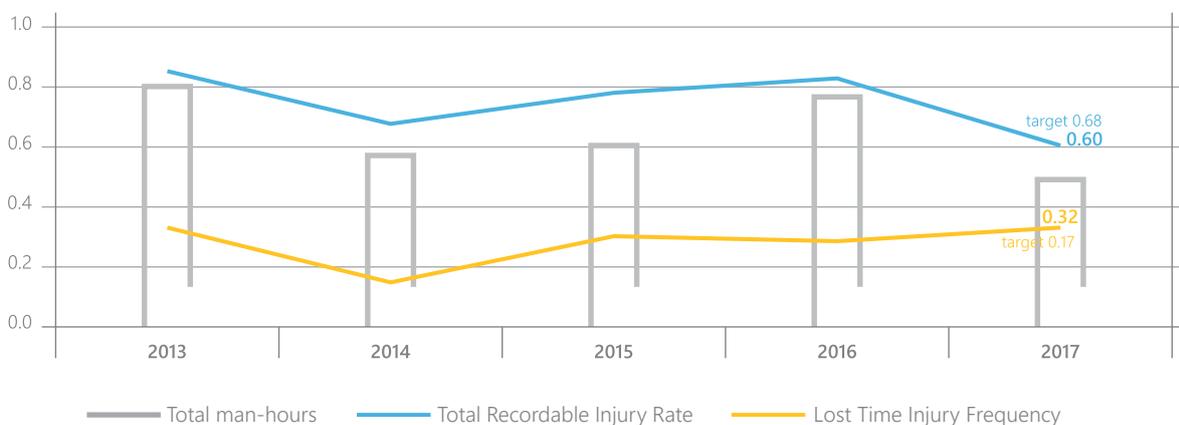
It is a guiding principle that every worker must return home to family and friends uninjured, fit and healthy.

TOTAL RECORDABLE INJURIES	15
LOST TIME INJURIES	8

2017 results

Safety performance is measured by the Total Recordable Injury Rate (TRIR), the total number of injuries sustained per million man-hours worked, and by the Lost Time Injury Frequency (LTIF), the number of cases of injury or illness that cause the worker to stay off the job for a time, per million man-hours. NCOC's performance is already equal or better than industry average. On top of that, our annual improvement objective is to make every year the lowest ever on record for our Project. We achieved our objective in 2017: TRIR dropped to an all-time low of 0.60. However, LTIF stayed mostly unchanged from 2016 and is still higher than our best-ever in 2014.

TRIR & LTIF GRAPH





More Information

More about NCOC's health and safety programmes can be found on our website at www.ncoc.kz, please see page 234 (2).

Incident Learnings in 2017.

In addition to a thorough investigation of all Lost Time and Reportable incidents, the Company also investigates "near-miss" incidents that did not result in injuries to personnel, following established company procedures. Root causes were identified, corrective actions to prevent re-occurrence developed, and lessons learned shared across the Company.

In 2017 there were eight "near-miss" incidents. No actual injury resulted; rather, a situation was observed that had potential to cause injury if not addressed. (The eight cases were all assessed as "medium" potential. None were found in 2017 associated with "high" potential.) The observed "near misses" were mostly associated with work or equipment at elevations greater than 2 m, for example:

- A detached cable tray at 5m elevation was found lying on a main deck
- A scaffolding tub fell from 4m elevation
- A walkway was found without handrails at ~20m elevation

In addition to incident and near-miss investigations, we progressed several initiatives that reinforce Safety as an NCOC value, including the following:

- **"Working Safely Together" Forums.** Senior management, NCOC contract holders, and key contractor representatives participated in specialized Forums to emphasize health and safety topics with Project contractors.
- **Health and Safety Workshops.** Several were conducted in 2017 at various NCOC fields and office locations.
- **Leadership Tours.** Over a hundred visits focused on health and safety were conducted by all levels of management, from senior to frontline.

4.2. PROCESS SAFETY AND ASSET INTEGRITY

A Process Safety incident is an unplanned or uncontrolled release of material from process containment. Management of Process Safety involves keeping our oil, gas and process chemicals inside the production facility plant and equipment so they do not cause harm to people, asset damage or environmental impact.

To achieve our Company vision and value of "Working Safely," all our production facilities are designed and constructed in accordance with best-practice industry standards. We implement Company processes and procedures to ensure they are operated safely, well-maintained and regularly inspected. Staff undergo training and competency development so they are able to manage and operate our facilities safely. Our Asset and Maintenance Management procedures are designed to prevent the release of hazardous materials, and reduce the consequences of releases should they happen.



Process Safety Key Performance Indicators, audits, inspections and reviews are used to monitor and improve the implementation and effectiveness of our management systems. We investigate if a release of hazardous material occurs, and use the learnings to improve our processes and procedures.

We have personnel and equipment in place to deal with leaks and any resulting consequences, including fires and explosions, toxic gas release and spills to the environment. All our emergency response plans are routinely tested with drills and exercises.

We measure and report Process Safety incidents according to industry standard API RP 754. This includes a measure of the consequence of the incidents, with Tier 1 being the most significant.

In addition we monitor Process Safety Key Performance Indicators relating to Demands on Safety Systems (Tier 3), and Management System Performance (Tier 4) and implement corrective actions as needed.

During 2017, our first full year of production operations, we recorded 3 Tier 1 events and 11 Tier 2 events. The three Tier 1 incidents in 2017 were associated with releases of gas and well fluids in excess of API RP 754 quantities. While there were no associated releases outside of the fencelines nor harm to personnel, they represent an opportunity to improve existing barriers to prevent recurrence. A rigorous method of investigation and discipline in implementation of corrective actions to correct design issues and reinforce expectations around safe operating procedures is in place.

4.3. FRESH WATER

NCOC is committed to maximize conservation of fresh water.

Water Risk

NCOC onshore operations are located in an area identified by the WRI Aqueduct Water Risk Atlas (2014) as medium to high risk exposure for oil and gas operations.

Performance

The total volume of fresh water consumed in NCOC operations in 2017 was 1169 thousand cubic meters. The total volume of fresh water withdrawn in 2017 was 1148 thousand cubic meters, only slightly more



than last year. This is remarkable since we produced eight times more oil than in 2016. The decisive factor was **new water processing capacity that came online in 2017. This additional capacity allows increased recycling of process (technical) water rather than discharging the water as waste, resulting in a 50% decrease in the total amount of water needed to be withdrawn by Bolashak Onshore Processing Plant from the Astrakhan-Mangyshlak pipeline.**

Normalized fresh water intensity (the proportion of fresh water consumed per unit of production) is reported here for the first time: in 2017, 93 tonnes of water per thousand oil-equivalent tonnes of production. NCOC obtains most of its water on a

contractual basis from the Astrakhan-Mangyshlak pipeline, which is sourced from the Volga river basin; other sources are municipal and bottled water. Water is used at the Bolashak OPF for producing steam for processes and in the camps for household use. Offshore facilities also need fresh water: 21,000 m³ was produced from desalination units offshore. This replaced fresh water that would otherwise be sourced from onshore.

Desalination was down sharply in 2017, as the 2016 pipeline replacement project had completed and demobilized by this time, and far fewer construction workers were housed offshore.

Policies, plans and programmes

We consider it our responsibility to other water users in this area to use our portion of the fresh water supply efficiently and sustainably. The water we use is discharged to lined evaporation ponds within the Sanitary Protection Zone and does not come in contact with groundwater or soil. It evaporates and is not returned to the local watershed. Since there is no return flow, the only way to share more water with other users in this watershed is to reduce the amount of fresh water we withdraw. Multiple re-use (recycling) of the water is the best way to accomplish this.

NCOC is pursuing this with a long-term plan. In 2017 NCOC treated and recycled about 14,000 m³ of water from household use onshore for greenbelt irrigation and for dust suppression purposes. We also recycle water for domestic use offshore. By far the greatest impact may be had through recycling of the water used in technical processes. In 2018-2020, NCOC intends to build a new additional water processing facility at Bolashak that will maximize our capacity for recycling water from this wastewater stream even further.



More Information

Information on Aqueduct Water Risk Atlas can be found on the website of the World Resources Institute at www.wri.org.

4.4. GREENHOUSE GAS EMISSIONS

NCOC is committed to reduce its Greenhouse Gas (GHG) emissions to the lowest level compatible with operational constraints and safety. We believe the most effective way to achieve that is a combination of high operational reliability, and continual improvement in the efficiency of our energy usage.

Total direct GHG emissions from NCOC operations in 2017 totaled 2,974 thousand metric tons CO₂-equivalent, including 2,852 thousand tonnes of carbon dioxide (CO₂), 115 thousand CO₂-equivalent tonnes of methane (CH₄), and 6.7 thousand CO₂-equivalent tonnes of nitrous oxide (N₂O). This total includes mobile and stationary sources.

This is roughly double the emissions of 2016, in the context of an eight-fold increase in production. Less-than-expected flaring is one reason for this result.

NCOC production facilities are self-sufficient in electricity, heat and steam. Indirect emissions arise from purchased power for support facilities such as Bautino Marine Support Base and Atyrau Training Center. Total indirect GHG emissions from NCOC operations in 2017 totaled 10.2 thousand metric tonnes CO₂-equivalent, all carbon dioxide.

Normalized GHG intensity (the proportion of greenhouse gases emitted per unit of production) is reported here for the first time: in 2017, 237 CO₂-equivalent tonnes per 1,000 equivalent tonnes of oil produced. Comparison to other projects is difficult, due to methodological and baseline differences. But it is a general rule that an offshore “sour” oil project still in the commissioning phase, such as the North Caspian Project, may be expected to have higher specific GHG emission than less energy-intensive onshore or “sweet” oil projects in steady-state. This intensity number is best used by stakeholders to compare NCOC’s own performance from year to year.

There are various approaches to estimating Other Indirect (“Scope 3”) emissions. NCOC will report volumes of produced oil and gas to enable stakeholders to estimate these emissions from the NCOC value chain using their preferred methodology.

“National Plan” for Emissions Trading

In 2017, the RoK Government approved a National Plan for the re-start of a CO₂ emissions trading system. The trading system covers only about half of all emissions in Kazakhstan – excluding transportation, residential and agriculture, for example – and focuses on 225 facilities in power generation, industry and natural resource extraction, including NCOC’s onshore and offshore facilities. Under the National Plan, each facility over a certain size is given a three-year “quota” of CO₂ that it is allowed to emit. If it emits less CO₂ than permitted, the unused quota may be sold on the Caspy trading exchange. If on the contrary it emits more CO₂ than permitted, it must buy quota from others to make up the shortfall, or pay a penalty. The net result is a “cap” on industrial emissions, which can be controlled by the Government. Industrial facilities account for roughly half of Kazakhstan’s total GHG emissions. This is important for the Republic’s compliance with international agreements on reducing emissions linked to global climate change.

In 2017, NCOC received a quota of 13.6 million tonnes of CO₂ to be emitted in 2018-2020.

CASPIAN FAUNA

The Caspian fauna is represented by 1,809 species, including 415 vertebrates.

101 fish species are recorded in the Caspian Sea. This sea is notably the habitat for the majority of the world sturgeon stock. The largest sturgeon species is white sturgeon, with the weight of some specimens reaching 1.5 tonnes. The largest mammal in the sea is the Caspian seal.

Approximately 312 bird species nest in the Caspian coastal area, including numerous rare species. Most birds are migratory.

	species listed in Kazakhstan Red Book	total number of species
	54	Caspian flora 229
	27	freshwater and sea fish 101
	9	reptiles 20
	63	migrating and wintering birds 312
	41	mammals 125



5. ENVIRONMENTAL STEWARDSHIP

5.1. POLICIES AND PROGRAMMES

Policies

NCOC is committed to developing a world-class project that is designed and operated in a manner protective of the unique, sensitive environment of the North Caspian Sea. We conduct our operations responsibly and in full compliance with the laws of the Republic of Kazakhstan, and in line with accepted international regulations, standards and best practices.

Our approach is one of risk management. Conceptually, that means identifying and understanding the risks of any action and its potential impacts; taking steps to minimize that risk or mitigate its impacts down to acceptable levels; and continually re-checking the risks and improving the measures to address them.

Programmes

Important environmental compliance and protection programmes include Environmental Impact Assessments, baseline studies and monitoring, and environmental sensitivity mapping.

Availability

NCOC shares the conclusions of its environmental monitoring in many forms: peer-reviewed academic publications, reports, public hearings, EIAs, presentations at public and industry forums, the NCOC website and media articles. NCOC provides the environmental monitoring data it collects directly to the government agencies responsible for environmental protection, per terms of the North Caspian PSA. These agencies ensure that the public is appropriately informed. For example, the Department of Ecological Monitoring of RGP Kazgidromet (RoK Ministry of Energy) publishes monthly, quarterly and annual reports on the state of the environment that include an appendix of analyzed data from NCOC industrial air quality monitoring stations at Bolashak and surrounding areas.

Environmental Protection Plans

NCOC's environmental protection activities are guided by an Environmental Protection Plan (EPP) that is approved annually by state environmental regulatory agencies. The type of projects included



More Information

More about NCOC's environmental stewardship can be found on our website at www.ncoc.kz, please see page 234 (3).

Kazgidromet's periodic bulletins, including data from Bolashak air monitoring stations, can be found at www.kazhydromet.kz.



More Information

More about NCOC's actions to protect biodiversity can be found on our website at www.ncoc.kz, please see page 234 (4).

Published research on the Caspian seal can be found at www.sealresearch.org, www.2mn.org.

in the annual EPP: environmental surveys and monitoring of air, water, soil, and biodiversity; solid and liquid waste management; oil spill response; green spaces; and environmental education. Reports on implementation of the EPP are submitted to the government quarterly.

5.2. BIODIVERSITY OF THE CASPIAN ECOSYSTEM

The Caspian Sea as an ecosystem has a high percentage of rare and endemic species found nowhere else. Protection and preservation of this area's unique biodiversity is a top sustainability objective.

Policy, plans and programmes

Four marine environmental surveys (one at each season of the year) and two onshore surveys are carried out each year. These covered wildlife and plant life, bottom organisms, soil and air quality, in order to better understand species distribution and population dynamics of Caspian biota. Over 100 such environmental and wildlife surveys have been conducted since the start of the Project.

NCOC has developed special Biodiversity Action Plans for at all stages of engineering and construction in both onshore and offshore environments. Some programmes are described in more detail below for key indicator species.

Caspian Seal

As we have done every year since 2005, NCOC conducted a seal survey in 2017, using Kazakhstani experts with oversight by scientific institutes in Kazakhstan and Russia. The 2017 seal survey began on February 3





and lasted three weeks. Twenty volunteer seal observers from NCOC were also on board at various times, helping the experts to cover the route between Bautino Marine Support Base and the Kashagan field area on the icebreakers Mangystau-2, 3 and Tulpar. Meiramgul Bulekbayeva, a Contracts Administrator, said of her experience: "Prior to participating in the survey I saw Caspian Seals only in presentations and video. I never had the chance to see these beautiful animals in the wild and it was really exciting. Our production operations may affect flora and fauna and we are committed to do our best to minimize this potential impact. There are always ways to preserve wildlife; it just takes a little more effort."

The observer teams were accompanied by inspectors from the Atyrau Oblast Department of Ecology and the Oblast Territorial Forestry and Wildlife Inspectorate.

Fish

For many years, NCOC has funded studies and made voluntary financial contributions for a variety of fish hatchery upgrade projects. In 2016, NCOC pledged sizable contributions to fish hatcheries on the Ural River as part of its compensation obligations, aimed at producing over 700 thousand sturgeon fingerlings for release in coming years. On July 20, 2017, the State Ural-Atyrau Sturgeon Hatchery in Kurilkino village released about 235 thousand fingerlings into the Ural River, the second such annual release quantity as part of NCOC's contribution.



2017 Bird Surveys

Every year, NCOC conducts four types of bird surveys. These surveys involve the monitoring of birds during seasonal migrations (in spring and autumn), studies of nesting colonies in near-shore areas during mating season, the over-winter monitoring of aquatic and semi-aquatic birds and observations around onshore and offshore facilities.

The surveys cover a vast area from the Volga River delta in the west to the Emba River delta in the east, from Atyrau in the north to Aktau in the south.

The surveyor groups include NCOC and contractor ecologists and ornithologists, and inspectors from the Atyrau Oblast Department of Ecology and the Oblast Territorial Forestry and Wildlife Inspectorate.

In 2017, the spatial distribution and number of birds largely matched seasonal and behavioral patterns for each species. However, this year further decrease of bird habitat was observed along the northern coastline of the Caspian, presumably caused by wildfires and a continuing decline of local sea levels. This, plus poaching activity, may be a reason for the observed decrease in the number of birds in the Volga and Ural River deltas, and corresponding increase in the number birds observed in the warm, shallow waters around the Seal Islands, where protective cover abounds.

The population density of birds during autumn migrations remains quite high – about 25,000 birds per 30 km², according to data of the survey in September 2017. The population of one key indicator species – mute swan – remains stably high, with 61,500 recorded in 2017 (compared to 61,700 in 2016).

Bird Death Incident

On October 24, 2017, after a period of low cloudiness and rain, workers on D Island saw many small dead birds floating in the sea under a vertical wall of Module 18. Inspectors later estimated their number at 243, all of the same passeriformes (lark) species. The Atyrau Oblast Department of Ecology and the Atyrau Oblast Territorial Forestry and Wildlife Inspectorate were informed about this incident and their specialists carried out an unscheduled inspection. Six dead birds were sent to Microbiology and Virology Institute in Almaty for bacteriological and virological analyses and autopsy. According to the official conclusion of the Institute the birds were emaciated and appear to have collided in flight with a fixed





structure. There was no flaring activity at the time. It is presumed the birds became disoriented in the low visibility and bad weather, and flew into the structure. Atyrau Oblast Territorial Forestry and Wildlife Inspectorate made a claim for damages in the amount of 2.7 million tenge (approximately US\$8,000) to NCOC. NCOC is studying further measures to prevent reoccurrence.

5.3. DISCHARGES TO WATER

NCOC uses lined evaporation ponds as the safest available method for managing treated industrial water. All treated wastewater from industrial processes and domestic sewage is discharged through filtration screens into these ponds, **with no further discharge into surface waters, including the Caspian Sea.**

NCOC obtained all permits in 2017 for discharge of treated water to evaporation ponds in accordance with RoK environmental requirements.

5.4. NON-GREENHOUSE GAS AIR EMISSIONS

In 2017, NCOC air emissions from all operations were 15% of permitted volumes, and totaled:

- 608 tonnes of volatile organic compounds (VOCs)
- 41,717 tonnes of oxides of sulfur (SO_x), and
- 2874 tonnes of oxides of nitrogen (NO_x excluding N₂O, which is reported under GHG Air Emissions).

Compared to 2016, VOC and SO_x emissions were down slightly and NO_x roughly doubled in 2017, in the context of an eight-fold increase in oil production. Much of this improvement is due to less-than-expected flaring.

Air Quality Monitoring

Twenty air quality monitoring stations in Atyrau oblast operate 24/7 to measure the atmospheric levels of various compounds and collect weather data.



More Information

More about air monitoring can be found on our website at www.ncoc.kz, please see page 235 (5).

Four stations are located on the perimeter of the 7 km setback area (Sanitary Protection Zone or SPZ) for the Bolashak Plant; seven more are located in surrounding areas, including Dossor and Makat; and nine are in Atyrau city proper. The government meteorological agency Kazgidromet monitors this air quality data and publishes monthly and annual summary bulletins on its website. In late 2017, on-line access and training was also provided to the Atyrau Oblast Department of Natural Resources and Nature Use Regulation.

Hydrogen Sulfide

Hydrogen sulfide (H₂S) is another non-GHG air emission that concerns many. It is flammable and highly toxic, and has a strong, unpleasant odor. It may be generated anywhere that sulfur-containing organic materials decompose in the absence of oxygen, so is emitted naturally in marsh gases and volcanoes (sometimes in large quantities). It is produced also at tanneries and pulp/paper mills, and during sour crude oil processing and transportation.

NCOC specialists who work in immediate proximity to wellheads, flash gas compressors and other equipment receive special training and personal detectors. They wear masks and breathing apparatus as a precaution in areas where high H₂S concentrations are possible as an occupational hazard. The risk drops off quickly the further from these locations; so do the potential concentrations.

NCOC can state with confidence that the Bolashak OPF is safe for the public. The primary guarantor of safety is the 7 km buffer (SPZ) around Bolashak, sufficient to protect nearby residents from any long-term health effects from air emissions and providing a conservatively high margin of safety even for unplanned events. Confidence in this conclusion rests upon careful design, studies and computer models, government review and approvals, and finally, recent operating experience that confirms the models. As in 2016, this on-going monitoring in 2017 shows consistently that short-term H₂S peaks (from 1 to 20 minutes in duration) remain far more likely in Atyrau than near Bolashak. The competent government agency for air monitoring RGP Kazgidromet confirmed there were no cases of high- (VZ) or extremely-high pollution (EVZ) registered

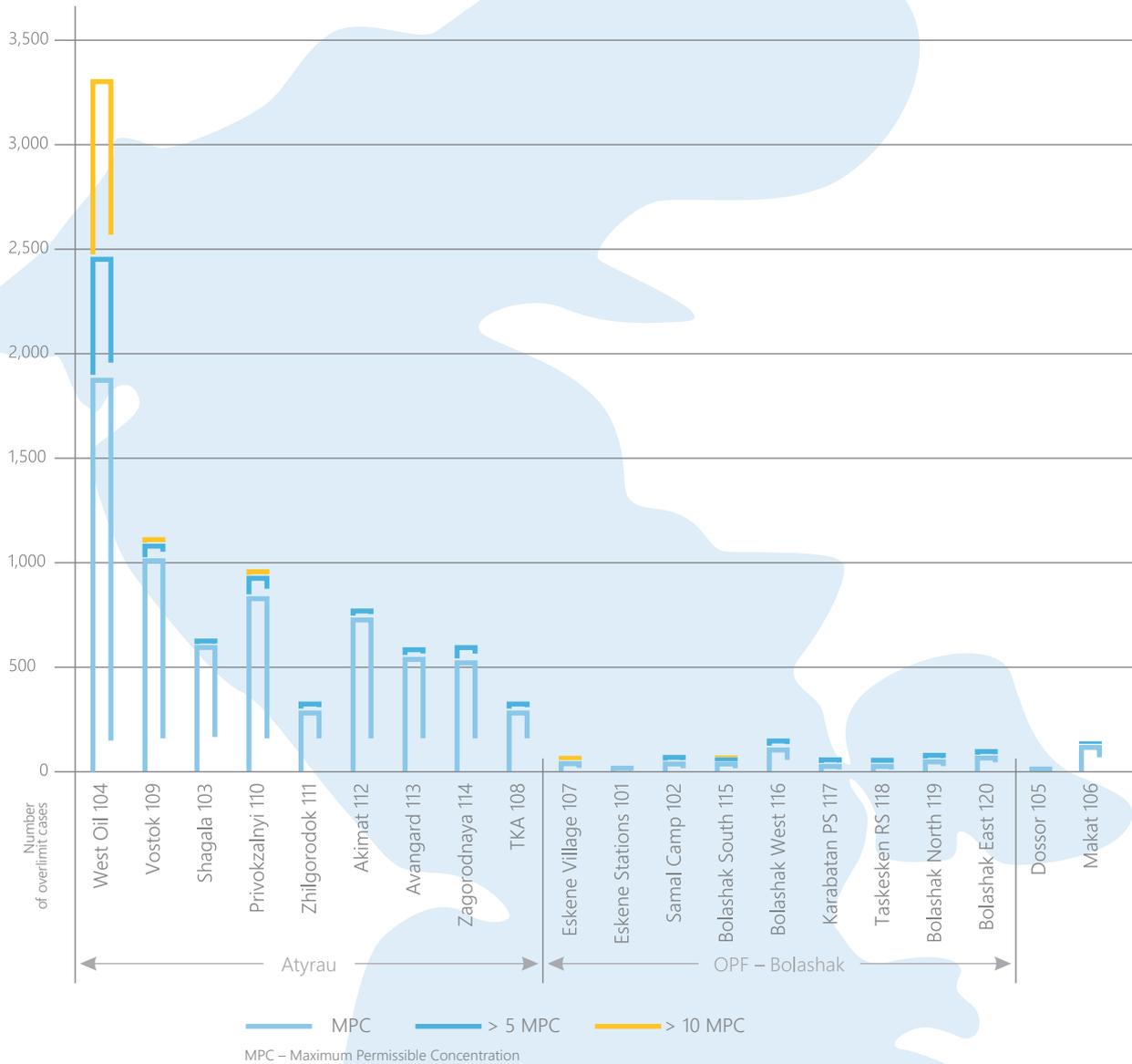
Ransomware Attack in 2017

On May 12, 2017, NCOC was one of many companies around the globe that was impacted by the WannaCry ransomware attack. (See the section on Security.)

The Company's twenty air quality monitoring stations were not impacted by the attack, and all continued to take data. However, the on-line transmission of this data to Kazgidromet was temporarily suspended for safety reasons. It was resumed in September, and RGP Kazgidromet has published all of NCOC's 2017 data in its annual summary bulletin.

NUMBER OF H₂S OVERLIMIT CASES

January-December 2017



This graphic shows along the x-axis the twenty NCOC air quality monitoring stations arranged roughly in order of distance from a point in Atyrau City. The vertical bars represent the number of instances (of short-term duration less than 20 minutes) in which each station registered H₂S concentrations in excess of Minimum Permissible Concentrations. See Legend for color coding.

Note 1: This diagram shows only H₂S. In addition, NCOC air quality monitoring stations register CO, SO₂, NO and NO₂ levels. Note that SO_x and NO_x are possible combustion products from the flaring of sour gas. If H₂S were to arise, it is almost always from a leak.

Note 2: "Maximum Permissible Concentration" set by the Kazakhstan government is a conservative standard. These levels, tens of thousands of times less than immediately harmful levels, are so small that electronic instruments sometimes have trouble accurately detecting them. False "peaks" are common, as are short-term peaks from, for example, a passing train.

around Bolashak in 2017. See the report "Informational Bulletin on the Condition of the Environment of the Republic of Kazakhstan, 2017" (www.kazhydromet.kz), in which the data from all twenty NCOC air monitoring stations is published in summary form.

5.5. OIL SPILLS TO THE ENVIRONMENT

Performance

In 2017, there were 0 hydrocarbon spills greater than 1 barrel reaching the environment from NCOC operations (total volume: 0 barrels of oil-equivalent hydrocarbons).

Approach

NCOC places first priority on prevention of oil spills. Secondly, no matter how confident we are of their prevention, NCOC remains always prepared to respond quickly and fully to incidents were they to occur.

2017 Actions

- **Prevention.** By far the best defense against oil spills is to prevent them from occurring in the first place, identifying spill risks and ensuring that the highest safety standards are continuously applied to mitigate those risks.
- **Technology.** We employ a wide range of innovative technologies to assist in responding to oil spills, and are actively engaged in research on new and more effective methods (see Arctic JIP case study below).
- **Response Training.** NCOC maintains a comprehensive Oil Spill Response Plan that is regularly drilled, including joint exercises with responsible government agencies. NCOC also has a dedicated Oil Spill Response group, with about a hundred fully-trained staff, and equipment suitable for the harsh environment of the North Caspian Sea stored at marine support bases in Bautino and Damba. In 2017, NCOC conducted more than a hundred major and minor exercises at all locations, involving training for more than 700 NCOC staff and contractors.

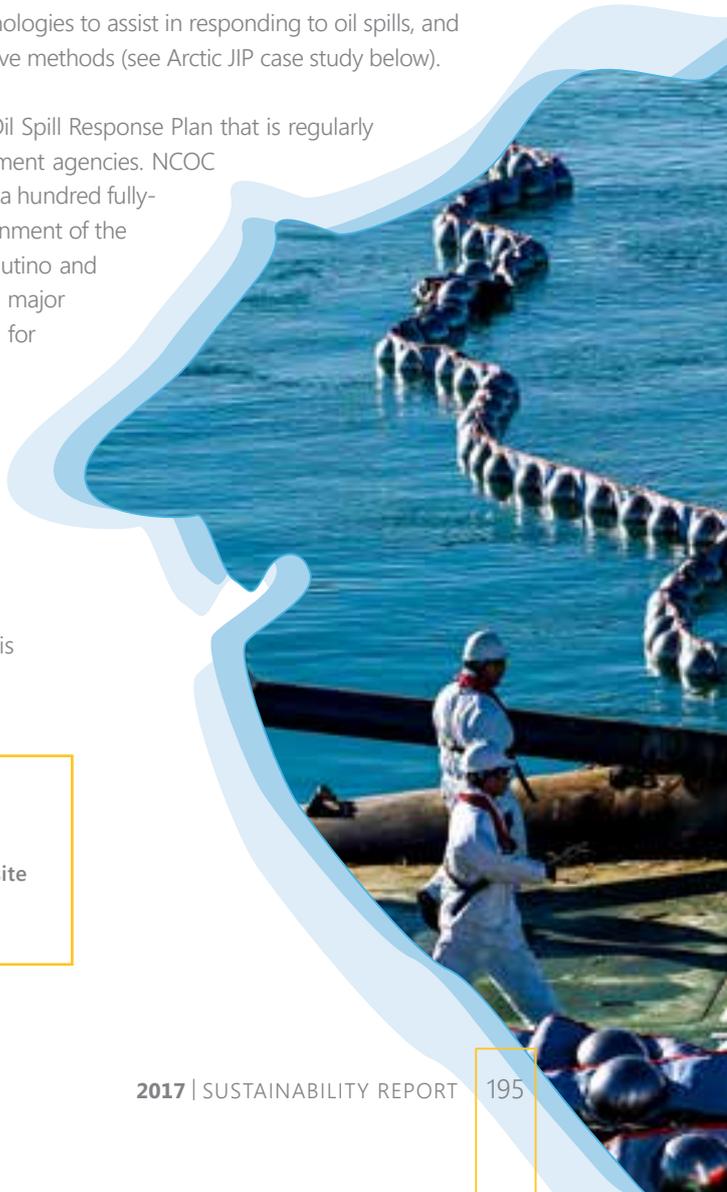
5.6. WASTE

Total quantity of waste generated from NCOC operations in 2017 is 26,353 tonnes, including 17,310 tonnes classified as hazardous according to the RoK Environmental Code. This



More Information

More about oil spill response can be found on our website at www.ncoc.kz, please see page 235 (6).





Case Study

Arctic Oil Spill Response Technology

In January 2012, nine company-members of the International Association of Oil and Gas Producers (IOGP) launched a collaborative effort to enhance Arctic oil spill capabilities. This initiative is called the Arctic Oil Spill Response Technology Joint Industry Programme (JIP). The companies (BP, Chevron, ConocoPhillips, Eni, ExxonMobil, Shell, Statoil, Total and NCOC) jointly carried out a series of advanced research projects in laboratory conditions in six key areas: dispersants, environmental effects, trajectory modelling, remote sensing, mechanical recovery and in-situ burning. Arctic JIP research focused on priority areas where new research and technology development had the best chance of significantly advancing capabilities to respond to marine spills in the presence of ice, in the near future.

The Arctic JIP concluded and published its results in 2017. An enormous amount of scientific data and detailed technical reports were produced, bringing together the best current knowledge and experience in the world as regards oil-in-ice response. ***The next step for NCOC is to review and analyze Arctic JIP outcomes against NCOC's current oil spill response capabilities, in order to identify what could be adopted to further improve our winter response techniques and practices.***

The following is a short summary of the advancements in knowledge in the six key areas. For more details, see the Arctic JIP website (www.arcticresponsetechnology.org).

Mechanical recovery

Mechanical recovery means equipment that physically gathers the spilled oil and transfers it to vessels for disposal. Research assessed the feasibility of developing new mechanical recovery concepts and concluded that, due to fundamental constraints related to the physics of oil spreading in ice, substantial improvements to recovery effectiveness through design and engineering were unlikely. Utilizing technological advances in other fields could prove more beneficial, for example making better use of remote sensing to direct vessels and crews on the surface.

In situ Burning

In situ burning means "herding" the spilled oil together on the surface and concentrating it where it may be easily ignited and converted into dispersed combustion products having lesser environmental impact. The research showed that "herders" and burning may be used together to expand in situ burning to include very open ice and open water offshore. Herders (chemical oil-herding agents) are chemical surfactants. When applied to the water surface immediately around the oil slick the "herder" reduces water surface tension and can be used to contain and shrink the oil slick, increasing the thickness of the oil for further recovery. An integrated aerial herder and ignition system was developed and field-tested. It enables an effective response without requiring crews in boats on the water surface to deploy booms. Regulators and responders in Alaska and Norway attending the JIP's field trials had the opportunity to see the potential of herding and burning as a valuable new strategy for rapid response in remote areas.

Dispersants

Dispersants are compounds that are applied to oil to break it into smaller droplets that may then "disperse" broadly in the water rather than collect on the surface. The research acquired new test data on expected



dispersant effectiveness in ice as a function of a wide range of physical variables. Results showed the potential for high effectiveness in a wide range of ice concentrations for different oil types as long as sufficient mixing energy is available.

Trajectory modelling

Trajectory modelling refers to computer models that use wind/weather conditions and oil data to predict how an oil slick may expand and where it will go. The research here supported the development of improved ice drift models, and then adapted existing oil fate and behavior models to improve the prediction of oiled ice movements in different ice conditions.

Remote sensing

Remote sensing refers to the ability to spot oil slicks from satellite data. The research evaluated the capabilities of different under-ice and above-ice sensors to detect and map oil spills in ice under simulated conditions. The new data was used to produce a responders' guide to selecting the most effective remote sensing systems for a range of oil-in-ice situations.

Environmental effects

Research here created an information support tool that provides web-based access to 3,500 literature sources to assist in applying Net Environmental Benefit Analysis (NEBA) to future Arctic spill assessments. New environmental effects data was collected that demonstrated no significant environmental effects on sea ice biological communities from oil frozen into the ice upper surface of ice.



number includes some wastes classified as green under Basel Convention rules, such as office equipment, wood and food waste, spent air filters, etc. The total quantity of waste classified as non-hazardous by the RoK Environmental Code in 2017 was 9,043 tonnes.

Policies and Programmes

NCOC's Waste Management System includes a set of measures aimed at mitigating the environmental impact caused by operational processes and the resulting waste. The key purpose of waste management is "to reduce or fully eliminate waste generation at the source or the process" through proper planning of the Company's activities.

Waste management is performed throughout the life cycle of the waste starting from its generation to final disposal. The Company is solely liable for correct and safe waste transportation including the time period after transfer of the waste to another party for further processing and disposal.

In order to prevent adverse impact on unique flora and fauna of the Caspian Sea, NCOC adheres to a policy of "Zero Discharge into the Caspian Sea." All waste generated at offshore facilities is transported to onshore waste facilities by vessels specially equipped for safe loading and transportation of wastes and effluents.

Since the RoK Environmental Code now permits it, food and medical wastes are incinerated offshore. The ash after incineration is transferred to onshore facilities.

The rest of the waste generated at NCOC offshore and onshore facilities is handed over to a specialized waste management contractor, West Dala. Part is disposed at West Dala-owned facilities in Atyrau and Mangystau Oblasts, and part is handed over to specialized subcontractors for additional processing stages, for example:



Quantity of waste generated in 2017

- Used tires – Maximcheva PE, ECOTERRA LLP. Used tires are recycled by breaking down, cutting and chipping them, and extracting metal and fabric ply. The components are then melted and mixed with other additives at certain temperatures to produce rubber-safe paving flagstones and curbs.
- Metal scrap – Rich Resurs LLP, ALZ LLP.
- Plastic waste – Yegorova PE. Granulated plastic wastes recycled to produce roof tiles and paving flagstones.
- Paper and cardboard – Yegorova PE, Kagazy Recycling LLP. Pressed paper and cardboard is recycled into cardboard boxes, envelopes and bags.
- Used batteries – SCT Service Center Atyrau LLP. Electrolyte and other components are removed from batteries, then neutralized and recycled into new batteries. Battery scrap is processed in electrothermic furnaces to produce new generation batteries.
- Used oils – ECOTERRA LLP.
- Timber – Kaspiy Kommunalnyk Kyzmety LLP.



5.7. ONSHORE AND OFFSHORE SURVEYS

NCOC implements comprehensive environmental monitoring programmes to collect offshore data and analyze the chemical composition of seawater and bottom sediments, and to study fish, benthos and plankton populations. Since 1994 the Project has conducted about forty offshore monitoring surveys in roughly 900 different locations. Data collected during the twice-annual surveys covers weather conditions, water quality (salinity, nutrients, metals, etc.), bottom sediments quality (metals, total hydrocarbons, etc.), and biological data (micro-organisms, phytoplankton, zooplankton, benthos and fish).

5.8. DECOMMISSIONING AND REMEDIATION

Decommissioning is governed by the North Caspian Sea PSA, including detailed planning and funding at the appropriate time. Decommissioning is planned and executed in the same manner as any other engineering project, with each programme needing an environmental impact assessment to determine the preferred option to apply to a particular facility.



CASPIAN RIVERS

130 rivers flow into the Caspian Sea, but only six are large and have delta-shaped estuaries. These are Volga, Terek, Sulak (Russia), Ural (Kazakhstan), Kura (Azerbaijan), Sefid-Rud (Iran). Almost 90% of the annual water inflow into the Caspian Sea fall on Russian and Kazakhstan rivers. Volga brings approximately 250 km³ per year into the sea.

Due to significant inflow of fresh water from large rivers, the north part of the Caspian Sea is notable for its low salinity and serves as a habitat for numerous freshwater fish species.

River deltas have their own unique environments that are home to many rare flora and fauna species.



130

inflowing into
the Caspian
rivers



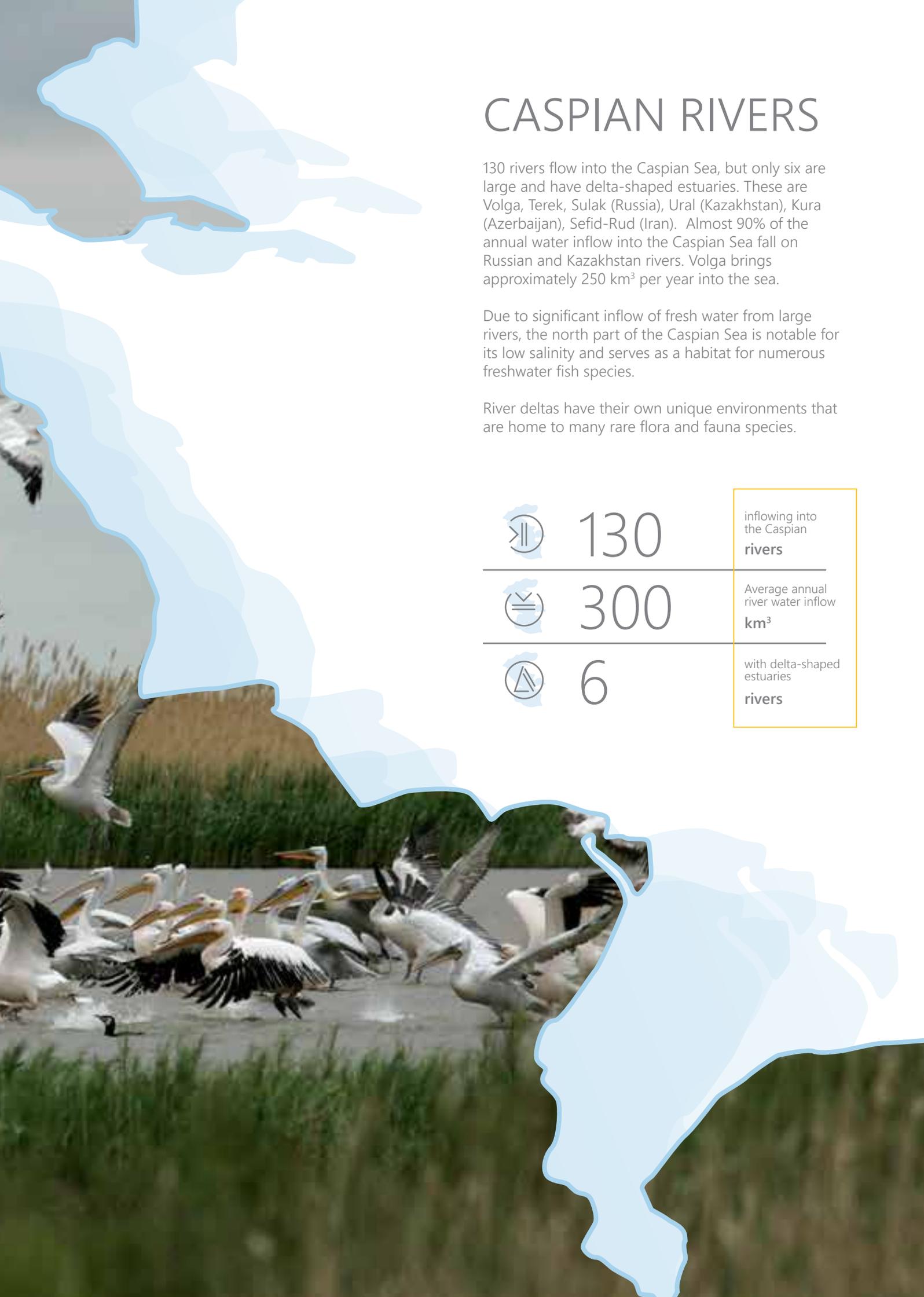
300

Average annual
river water inflow
km³



6

with delta-shaped
estuaries
rivers





6. ECO-EFFICIENCY

6.1. ENERGY

NCOC production facilities are self-sufficient in electricity, heat and steam. Indirect emissions arise from purchased power for support facilities such as Bautino Marine Support Base and Atyrau Training Center. Energy use in NCOC operations in 2017 totaled 29.8 million gigajoules (GJ), which is about double the energy use for 2016, in the context of an eight-fold increase in production. Of this amount, 0.12 million GJ was imported (purchased).

Normalized energy intensity (energy use per unit of production) is reported here for the first time: in 2017, 2.36 GJ per oil-equivalent tonne of production. In future years this number may serve as a guide to NCOC's performance in energy conservation.

In 2017 NCOC completed an energy efficiency survey of auxiliary facilities of the Atyrau Training Center in Atyrau City, and the Bautino Marine Support Base and Koshanai Waste Facility in Mangystau Oblast. As a result, a number of energy saving and energy efficiency projects are planned in the 2018-2020 period. One of the proposed projects calls for the installation of solar thermal collectors to heat water for the Bautino Marine Support Base canteen. Projects like these have a cost-savings component, but also an environmental component in reducing atmospheric emissions (pollutants), and in reducing GHG to reduce our carbon footprint. NCOC plans to continue this work in 2018 by conducting energy efficiency surveys at the main industrial facilities, as well as continue to study other potential projects in energy efficiency and conservation using renewable energy sources.

6.2. FLARING

NCOC has a “No Routine Flaring” policy.

The Kashagan Phase 1 Project was designed from the beginning to avoid routine flaring, i.e., the burning of excess natural gas “routinely” because an oil and gas project has no other economic way to dispose of it in the course of producing oil. On the contrary, all of the gas produced in Kashagan Phase 1 is re-injected, used as fuel or sold, once steady-state production is reached. Flaring is however needed in the course of operations as the safest and most effective way to deal with gas that for temporary technical reasons could not be processed, such as commissioning operations, small amounts of valve leakage into flare collectors, or one-time discharges to flare due to operational upsets. The volumes of gas flared in such cases is calculated and reported.

The quantity of hydrocarbon gas flared from NCOC operations in 2017 was 24% of permitted volumes, and totaled 104 million Sm³ (standard cubic meters). Flaring decreased in 2017 compared to the previous year, even as oil production increased by a factor of eight. Operational reliability has been better than expected, and this improved process stability during commissioning has allowed us to keep flaring below 2.4% of total produced gas volumes.



Case Study

Innovative Technology at NCOC

FISHERY GENETICS LABORATORY

NCOC N.V. funded the set-up of a hydrobionts genetics lab under the Kazakh Fishery Research Institute by the request of the Committee for Forestry and Wildlife, aimed at funding the protection, reproduction and use of fish resources and other aquatic animals". The Caspian region is essential in fishery and reproduction of the most valuable types of the commercial fish, including Acipenseridae sturgeon. In the 20th century due to fishing intensification, disorder of reproductive conditions as well as poaching expansion the Caspian sturgeons lost their economic importance. The number and species of Ural-Caspian Basin sturgeons during this period have changed considerably. The sturgeon stocks started decreasing in 1990 when fish catch was 1,930 tonnes. In subsequent years (2000 – 2008) the fish catch decreased to 326.180 tonnes.

Currently maintaining the sturgeon population depends almost entirely on fish-rearing and releasing juvenile fish from Sturgeon Hatcheries (SH). Therefore, we face a serious problem associated with preservation and maintaining genetic diversity of brood fishes used for reproduction of the natural sturgeon population. Implementation of genetic monitoring methods will allow to optimize fish-rearing, to promote the efficiency of SH operation and to reduce sturgeon reproduction expenditures.

The established genetic laboratory is the first and only one in the Kazakhstani fishery sector. The laboratory started using modern molecular genetic methods that make it possible to identify and assess the biological diversity of all Caspian sturgeon species, to carry out genetic assessment, to renew the genetic data bank of aquaculture and to perform genetic monitoring of sturgeon species.

In the future the laboratory will expand its research efforts and plans to operate in other areas of the work, such as:

- Develop genetic-based principles for maintaining, management, certification and monitoring of Ural Caspian Basin genetic bank;
- Apply brood sturgeon genotyping for optimal cross breeding scheme identification and obtaining genetically favourable offspring;
- Solve genetic identification issues and determine population and specific belongings;
- Confirm non-criminal origin of caviar from aquacultural individuals;
- Conduct genetic certification of equipment, import/export of water biological resources;
- Pick up and collect fish DNA from Kazakhstani water basins.

UNMANNED AERIAL VEHICLE (DRONE)

In summer 2017, NCOC's Operations Logistics team launched a pilot programme to test feasibility of use of the Unmanned Aerial Vehicles (UAV or "drones") in a variety of applications:





- Pipeline surveillance
- Security monitoring
- Inspection of flare stacks and telecom towers
- Bird and seal surveys
- Oil spill tracking and response
- Air monitoring
- Monitoring of large storage yards



The pilot test covered both fixed-wing and helicopter-type UAVs, over land and water. The UAVs may be equipped with a variety of sensors, including video, gas detectors (“sniffers”), and even night vision and thermal vision modes.

The UAV trial almost immediately proved its worth. Flare tips are hard to reach at the top of a flare stack, and are essential to production. To be safe, they are simply replaced on a regular basis during maintenance periods. But a close multicopter observation flight in 2017 showed that the D Island flare tip was in good shape, and did not need to be replaced. This avoided a potential day or more of production shutdown, saving substantial costs and avoiding the additional flaring that might be needed for replacement of the flare tips.

By far the biggest advantage of UAVs is personnel safety – reducing the risk exposure for human workers who would otherwise fly in helicopters, work at height, or be exposed to harsh environments.

The summer pilot programme is just the beginning. A winter trial in 2018 will test operation in extreme conditions, and try applications such as:

- Winter seal and bird surveys
- Ice reconnaissance
- Marine search operations (with live feed)
- Inspecting the inside of storage tanks (toxic/explosive atmospheres)
- Delivering small spare parts offshore
- Mapping (including 3D)

DIGITIZING OIL PRODUCTION AT KASHAGAN

NCOC is applying innovative informational-technological solutions to optimize Phase 1 oil production at Kashagan.

“Flux” downhole pressure and temperature sensors

The conventional way to monitor reservoir performance is to periodically measure the production rate of a well and intervene to perform in-well surveys to determine the contribution from each of its reservoir layers. This intrusive method is called “production logging.” While essential for sound reservoir management, it nonetheless results in lost production and greater safety risks for the personnel performing the intervention, and the data it provides is limited to a snapshot at a given moment in time.

As part of the RoK “Technology Roadmap” project, NCOC volunteered early on to experiment with new “non-invasive” technologies for production logging in Phase 1, and report back on our experience, to be considered in applying these technologies broadly to “smart” wells in future.



For Kashagan, this was not a trivial engineering task. Sensors had to be placed around a wellbore that is only 14 cm in diameter and perforated for over 600 m of the oil column near the bottom of the hole. These sensors must withstand hot, high-pressure fluids and gases laced with corrosive sulfur and sometimes small bits of rock and sand. The signal itself must get out of a 4 km hole, through a well that is divided into separate upper, intermediate and lower stages, and fitted at intervals with complicated chokes and flanges. Optical fiber connections could fail over a long run like this, due to misalignment or damage.

One of NCOC's service contractors suggested a hardware technology called WellWatcher Flux, deployed at wells in India in 2010 and in Japan in 2012. Kashagan is a bigger challenge, requiring higher resistance to pressure and H₂S content, and six times as much power to support a higher number of sensors. The advantage is that Flux sends signals up to the surface and power down to the sensors wirelessly using inductive coupling coils (hence the name). This means less risk of losing signal or power over multistage completions.

NCOC decided to give Flux a try. After several years of prototype development, Well KE02-06 near the EPC-2 island was commissioned, with Flux technology installed, just a few months before production restart in September 2016.

A workshop was conducted in early 2017 to assess the experience and consider improvements for future installations. Results are mixed. On the one hand, Flux installation added cost and almost three weeks to the schedule for well completion. Not all the sensors "survived" the rigors of installation and commissioning downhole.

The good news is that almost fifty quartz sensors did make it and are now positioned directly at the oil-bearing sand face, sending precise data once a second on temperatures and pressures. Best of all, there should be no need to send in oil workers to open Well KE02-06 on a regular basis for production logging.

Reservoir modeling

The results of the Flux experiment let us dream of a "smarter" oil field of the future, in which all wells could be fitted with real-time sensors to monitor downhole conditions. But data from individual wells means little until we can "connect the dots" to understand what is happening within the reservoir itself. That is the job of computer modeling.

First, it is helpful to recall that a reservoir is not an underground "lake" of oil. Rather, the oil has saturated layers of porous rock, acting almost like a sponge. On a microscopic level, bits of oil are able to find flow pathways among connected pores to move toward and into the producing wells. Above the reservoir layers are less "porous" layers of solid rock that stop or "trap" the oil from migrating further upwards to the surface (that's why it has collected in the reservoir). The situation persists until the moment a drill pierces that solid rock and into the spongy reservoir, giving the oil a new direction to move – toward the well and up to the surface. The higher the pressure, and the higher the "permeability" of the reservoir layers, the faster the oil moves.

As the oil in one location is produced into a well, it changes the local pressure, and this pressure change may be transmitted to other parts of the reservoir. The job of geologists and reservoir engineers is to understand the reservoir's structure, storage capacity and flow properties, and manage the performance of each well. The goal is to optimize the overall flow of oil as a result of pressure changes, and to economically recover the most oil from the reservoir. At Kashagan, some of gas that is produced is re-injected back into the reservoir from certain wells to keep the pressure high and the oil moving towards producing wells. Which wells should be used to inject this gas? And how will that affect the rate of oil flows at other wells?



To answer these questions, the geoscientists and reservoir engineers build a computer model of the reservoir. They start from all the 2D and 3D seismic “pictures” that show the structure and character of the subsoil layers. They further add in what is known of the physical properties of the oil, and of the rocks which contain the oil (especially porosity and permeability), which is assessed from rock samples brought to the surface when the wells were drilled. Model data is then completed with pressure, temperature and flowing data from production logging. Engineers and geologists make additional assumptions about what is happening in the vast reaches of underground rock between wells and if the assumptions are correct, the numbers will agree with the model. If not, they must modify the model so that it more closely agrees with observed behavior.

NCOC has a model like this for Kashagan. It is based on expert interpretation of the seismic and well data obtained from exploration, appraisal and development wells drilled so far. And it has been calibrated with production history to better predict the future production performance of active wells. Befitting Kashagan’s scale, the model is fairly large and more complex than most others in industry.

With the start of gas re-injection in August 2017, reservoir engineers at NCOC have learned a great deal about how the Kashagan reservoir reacts. Pressure decline is turning out to be more gradual than originally anticipated in the model. This means less room to accept reinjected gas, and hence production at Kashagan will reach a capacity of 370 thousand barrels per day more slowly than earlier anticipated. How much more slowly, and what can we do to accelerate this timing, are all questions reservoir engineers and others will be studying in 2018 and beyond as we strive to reach full design capacity at the earliest possible date.

“Big Data”

The trend toward digitalization of oil production is unstoppable. It demands investment in ever larger and more robust infrastructure to handle the large amounts of data and processing speed required.

NCOC is acting now to meet the need with construction of a new Atyrau Data Center, anticipated to come on line in early 2018. The Data Center, adjacent to NCOC’s Atyrau Training Center, will house about one thousand servers to fully cover existing and future computing demands. Costing about US\$13 million, the Center will actually reduce overall expenses by consolidating computer facilities in Munich, Milan and Kazakhstan into one facility. And it will leverage innovative architectural designs and IT infrastructure technologies to achieve high operational efficiency. Thanks to its state-of-the-art design, Atyrau Data Center in December 2017 became the first server facility in Kazakhstan to receive Tier III certification from the Uptime Institute, an internationally-recognized standard in operational reliability.

A Concluding Thought About Innovation

President Nazarbayev, in his address to the nation on January 9, 2018, called on industry to increase productivity through digitalization of processes, and more efficient use of natural resources using new information-technical solutions.

NCOC is already a pioneer in this field. As the experience with Flux sensors, reservoir modeling and the Data Center shows, digitalization is a journey rather than a destination. Many more years of investment and pilot projects will be needed to realize the full potential of these information-technical solutions. And sometimes things just don’t work as envisioned. But it is a journey that must be undertaken and even accelerated, where that is cost-effective in the long run. NCOC stands ready to help other industries in Kazakhstan with our experience in introducing such solutions to achieve higher productivity and greater sustainability of economic activities.



A Technology Roadmap for Kazakhstan

A remarkable document was published in May 2013, titled “Kazakhstan Upstream Oil & Gas Technology and Research & Development Roadmap.” Led by NCOC shareholder Royal Dutch Shell since 2010, this document was a collaboration of the four major Operators in Kazakhstan (including NCOC) with some two dozen academic institutions, and major global companies in oil and oil field services.

The “Roadmap” identified promising technology alternatives in fifteen “challenge areas,” assessed how quickly they might be needed, and how to coordinate the development of multiple technologies. Each of 230 different technologies was scored on its potential value, and likely ease of implementation, including creation of local capacity and training opportunities in Kazakhstan.

1. RESERVOIR CHARACTERISATION

- 1.1. Seismic data acquisition and processing
- 1.2. Reservoir description – geology, rock and fluid interpretation
- 1.3. Well logging and in-well monitoring
- 1.4. Core analysis and data interpretation
- 1.5. Fluid property analysis

2. FIELD EQUIPMENT

- 2.1. Corrosion plus equipment and materials for sour service
- 2.2. Operating in the ice and during cold weather
- 2.3. Management of sulfur

3. FLUID FLOW AND PROCESSING

- 3.1. Flow assurance and sand control
- 3.2. Water management

4. WELLS AND FIELD MANAGEMENT

- 4.1. Drilling and well costs
- 4.2. Field management: optimised recovery including IOR/EOR

5. HSE AND OPERATIONS

- 5.1. Emergency response and disaster recovery
- 5.2. Operational HSE risk reduction under sour production conditions
- 5.3. Environmental impact

The Roadmap continues to be used in 2017 as an organizing framework for understanding and guiding technological innovation in oil and gas in Kazakhstan. The Ministry of Energy calls periodic workshops at which contributors update the Roadmap and report on new developments and progress. For example, the Flux project (described in this section) was initiated and reported under Section 1.3 on Well-logging and In-Well Monitoring. As part of Section 1.3.1 on Reservoir Characterization, NCOC funded a feasibility study on a National Geological Database for the RoK Geology Committee. The results of the Arctic JIP (see Case Study) directly support Section 5.3 on Environmental Impacts.

NCOC is the moderator for Section 5 of the RoK Technology Roadmap “Health, Safety, Environment and Operations.”



CASPIAN ISLANDS AND PENINSULAS

The Caspian Sea has 50 large and medium-sized islands. These are now predominantly uninhabited, though some of them used to accommodate fishermen's settlements at different times. One of the last settlements is located on the Chechen Island in Russia. The Ashuradeh Island, the only island in the Caspian coastal area belonging to Iran, hosts a seafood processing plant. This plant produces more than 50% of Iranian black caviar.

10 large islands and archipelagos are located in the territory of Kazakhstan. Some of them are used for fishermen's operations. The largest island of the Seal Islands Archipelago, the Kulaly Island, hosts a weather station and a technical observation point of the Border Service of the RoK National Security Committee.

The largest Caspian peninsula is the Mangistau Peninsula that ends with the Tupkaragan Cape. Moreover, Kazakhstan owns the second largest Caspian peninsula, the Buzachi Peninsula. Other large Caspian peninsulas include the Absheron Peninsula that accommodates Baku, the capital of Azerbaijan, the Agrakhan Peninsula on the coast of Dagestan and the Miankaleh Peninsula in Iran.



50

large and
medium-sized
islands



350

total island area
km²



10

belonging
to Kazakhstan
islands



68

Kulaly Island area
km²



6

large and
medium-sized
peninsulas

7. ECONOMIC BENEFITS TO KAZAKHSTAN

Kashagan Phase 1 will have a production life of decades and its shareholders are expected to contribute billions of dollars in direct revenue to the Republic of Kazakhstan in terms of taxes and share of production.

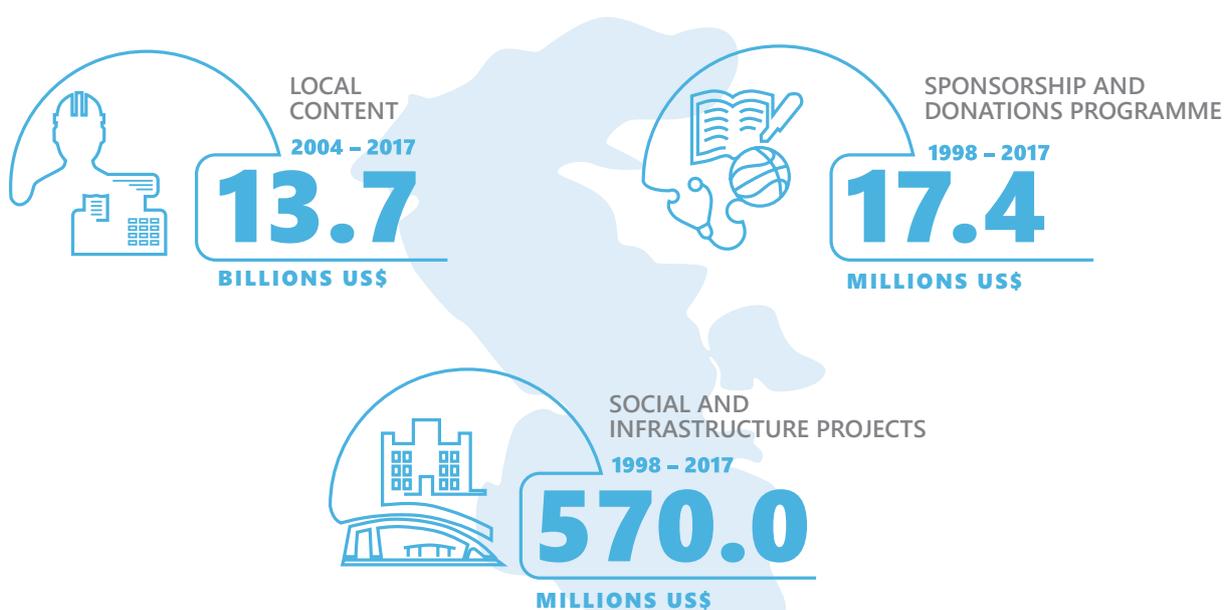
As Kazakhstan's largest direct foreign investment project, the North Caspian Project has a powerful multiplier effect on the economy, creating employment opportunities for Kazakhstan people and opportunities for local companies.

US\$328 million was spent for local content in goods, works and services in 2017, equivalent to 32% of total expenditures.

Overall payments for local content in goods, works and services have totaled more than US\$13.7 billion since 2004.

Mangystau and Atyrau oblasts also benefit directly from social and infrastructure related projects funded by NCOC. These have totaled well over a half-billion US dollars since the start of the Kashagan Phase 1 Project.

These and other economic and social benefits will be described in more detail in the following section.



8. SOCIO-ECONOMIC

To date, the Kashagan Project has directly contributed well over half a billion US dollars for the benefit of local communities.

8.1. SOCIAL AND INFRASTRUCTURE PROJECTS

Under the North Caspian Sea PSA, NCOG is required to allocate a budget each year for the development of Social and Infrastructure Projects. In 2017, this budget amounted to US\$50 million. The funds, for construction of schools, kindergartens, hospitals, sport facilities, as well as utilities such as roads, electric power water supply lines and other infrastructure designed to benefit the community, are split equally between Atyrau and Mangystau oblasts, where North Caspian Project activities are centered.

Social and Infrastructure Projects Completed in 2017

PROJECT	REGION
Construction of school for 120 students in Akkala village, Inder district	Atyrau
Construction of M. Otariyev general education school for 120 students in Akzhaiyk settlement, Atyrau city	Atyrau
Construction of motor roads – 9 streets	Atyrau
Construction of three-story residential building for 60 apartments in Makhambet village, Makhambet District.	Atyrau
Engineering and construction of electric power line 110kV: Atyrau Heating and Power Plant – “Nursaya”	Atyrau
Construction of the 110-10 kV cable insertion to 110 kV power transmission lines of the self-contained heating station- SS 110/10/10 kV Nursaya with a branch to SS 110-10 kV Zhumysker and SS 110/35/10 kV Kokarna	Atyrau
Design and construction of 110/10 kV ‘Nursaya’ (Zapadnaya) Substation and extension of 110 kV Outdoor Switchgear of Atyrau Power and Heating Plant for two grid blocks	Atyrau
Construction of outpatient clinic in Koktogai village, Inder district.	Atyrau
Construction of a community club for 200 places in Zhumysker settlement, Atyrau city	Atyrau
Construction of three-story residential building for 60 apartments in Inderbor village, Inder District	Atyrau
Construction of three-story residential building for 60 apartments in Dossor settlement, Makat District	Atyrau
Construction of school for 250 students in Bereke village, Makhambet district	Atyrau
Construction of multifunction Sports Complex in Aktau	Mangystau
Construction of youth center for 100 places in Aktau city.	Mangystau
Construction of street motor roads in villages of Beineu District	Mangystau

PROJECT	REGION
Construction of student dormitory for 500 places as part of student quarter in 32, 32A microdistrict, Shygys-1 microdistrict, Aktau city	Mangystau
Construction of cultural facility in Aktau city (House of Friendship)	Mangystau
Construction of a dormitory for 500 workers in Kuryk village of Karakiyan District	Mangystau

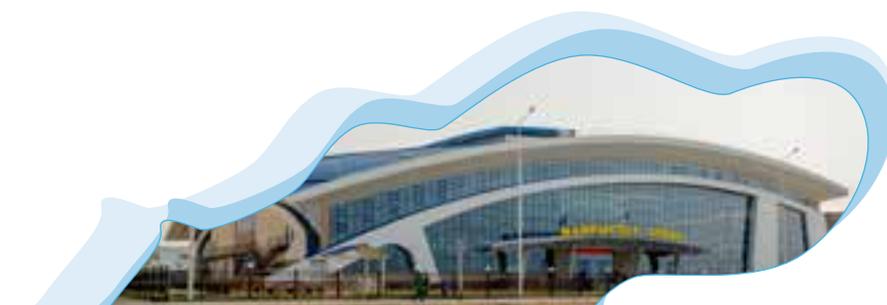
Between 1998 and 2017, 187 Social and Infrastructure Projects have been completed. Cumulative spend on social infrastructure projects has thus reached US\$570 million.

Social and Infrastructure Projects are generally proposed by the Oblast Akimats (governments). Proposals are analyzed by NCOC and the PSA Authority to ensure they comply with PSA requirements and the Operator's sustainable development strategy, and are developed into projects in close collaboration with the Oblast Akimats. Once approved, NCOC is responsible for all stages of design and engineering, contract tender and execution up to handover.



Social and Infrastructure Projects: An Integrated Approach

In 2017, NCOC implemented five Social Infrastructure Projects in the new 33rd Microdistrict of Aktau City. Close cooperation with Mangystau Oblast authorities has allowed NCOC and its contractors to take an integrated and long-term approach to the creation of an entirely new part of the city. We hope the 33rd Microdistrict will be a pleasant place for local residents and a "calling card" for the city, as well as serve as a visible and positive reflection on our Company. One project is the House of Friendship, opening soon. It is a social and cultural center that features an auditorium for the Assembly of Nations of Kazakhstan, a concert hall, and conference rooms suitable for high-level Summit meetings. Other parts of the center house office space for social and cultural organizations, an after-school center, a library, a Museum of Applied Art, a cinema, conference rooms, dance studios, and more. Another project is a Multifunctional Sports Complex, opened in 2017, for training and education as well as municipal and regional sports and cultural events. The other three projects are kindergartens for 280 children each.



8.2. SPONSORSHIP AND DONATIONS PROGRAMME

Through its Sponsorship and Donations Programme, NCOC responds directly to the needs and requests of local communities. US\$1.5 million is split equally each year between Atyrau and Mangystau oblasts for community sponsorship and donations. The Sponsorship and Donations Programme focuses on five main areas of support for local communities: healthcare, education, sports, culture and charity.

To be aligned with NCOC's sustainable development strategic goals, projects must contain elements of self-involvement and demonstrate sustainability for local communities. They should not support political or religious organizations, create conditions for unfair market competition, or undermine the ecological sustainability of local communities and/or natural ecosystems. The initiative for projects generally comes from the local communities, but may also be initiated by NCOC.

In 2017, 55 projects were undertaken (26 in Atyrau Oblast, 29 in Mangystau oblast). A total of \$17.4 million has been spent since 1998. In addition, up to US\$300 thousand has been budgeted each year since 2006 for a summer camp for 200 underprivileged and orphan children of Atyrau and Mangystau Oblasts. In 2017, NCOC covered travel, camp and cultural-educational development expenses to send these children to the "Baldauren" center in Burabai.



8.3. LOCAL CONTENT PERFORMANCE

NCOC is committed to developing a world-class project that maximizes the use of local goods, works and services, whilst developing the skills of local people and the capacity of local companies.

In 2017 the North Caspian Project spent US\$328 million for local goods, works and services, equivalent to 32% of total expenditures, for a year-end total of more than US\$13.7 billion spent on local goods, works and services since 2004¹⁰. These and other facts speak to the depth of NCOC's commitment to the use of local content.



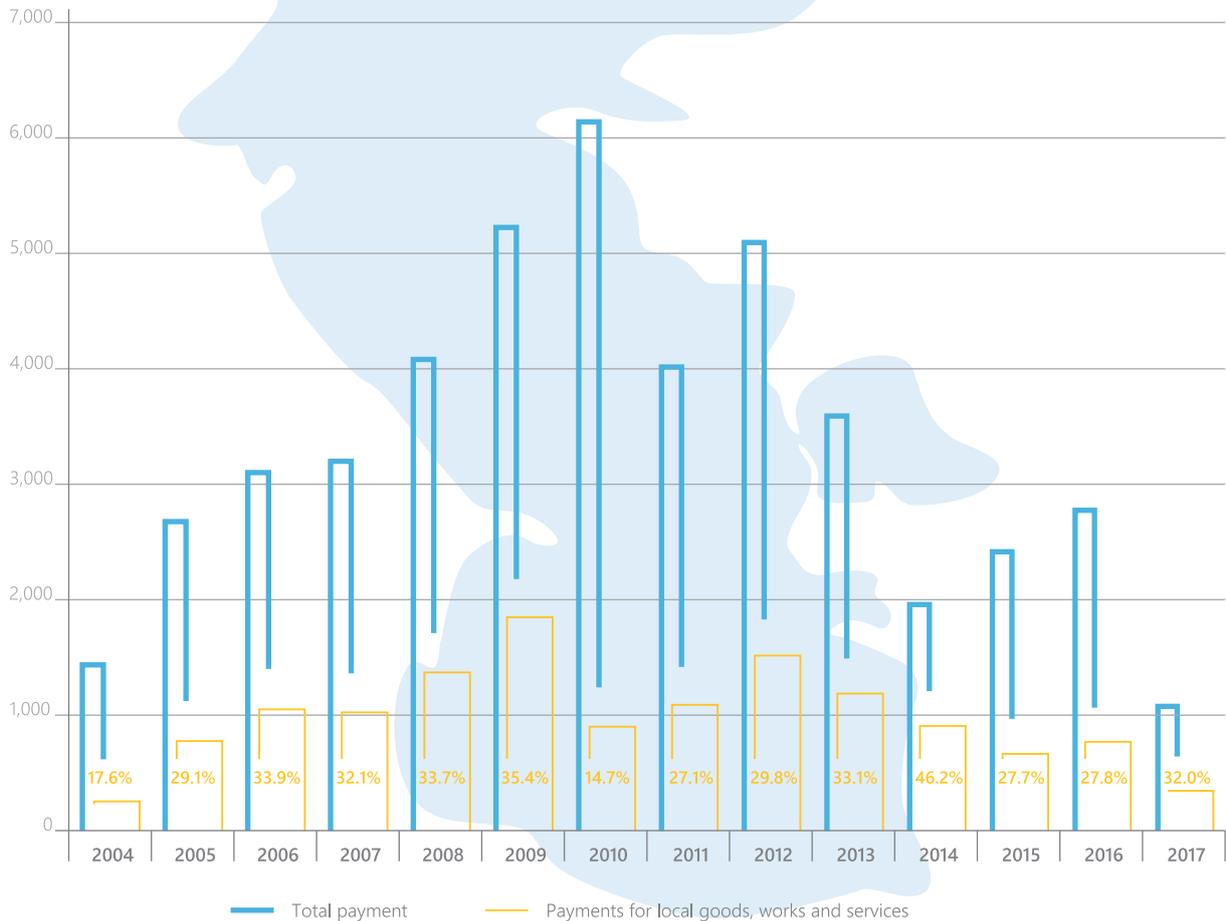
More Information

More about local content and community relations programmes and policies can be found on our website at www.ncoc.kz, please see page 235 (7).

¹⁰ Local goods, works and services are defined per Unified Methodology (2010) on local content calculations outlined in the RoK Law "On Subsoil and Subsoil Use." See Link to Subsoil Act definitions of local content used by NCOC. Prior to 2010 NCOC used local content calculation methods in the NCSPSA.

PAYMENTS AND LOCAL CONTENT PAYMENTS

2004 – 2017 (millions, USD)



8.4. LOCAL CONTENT: NCOC POLICY AND PROGRAMMES

NCOC Local Content Policy is based on the fundamentals of the North Caspian Sea Production Sharing Agreement (NCSPSA), applicable laws and NCOC's Mission, Vision and Values, and its business goals and objectives.

According to the NCSPSA, NCOC gives preference to local suppliers of goods and services subject to their competitiveness with respect to quality, safety and price requirements for similar materials and services provided by international suppliers. Thus development of Local Content is one of the most important and critical aspects of the Company's activity.

In 2017, NCOC developed and implemented a Five Year Local Content Development Programme. NCOC defined target areas for the participation of Kazakhstan businesses and detailed plans of activities and schedules to maximize Local Content opportunities for the period of 2017-2021. This Long Term Local Content Development Programme aims to ensure NCOC's contribution to economic growth of Kazakhstan society, to support the local community to achieve a mutually beneficial environment in

Local Companies Obtain International Certification with NCOC Assistance

On November 10, 2017, NCOC's Local Content Department organized an award ceremony in Atyrau for 15 local companies that completed international standards certifications in 2017 with NCOC assistance. The certifications (for ISO 9001 and OHSAS 18001 standards) attest to the level of suppliers' reliability and robustness. The Atyrau Chamber of Entrepreneurs "Atameken" joined senior NCOC management in congratulating the awardees on their achievement.



carrying out Petroleum Operations, and to successfully develop local suppliers and support them in building up their capacity.

An analysis of the future needs of the Project is also carried out with an eye to leveraging local content development opportunities, and consolidated in the Project's long-term procurement outlook.

NCOC's approach to local content development comprises three main areas: growing local industry capability; job skills training and knowledge transfer; enhancing local infrastructure.

2017 Progress Update on the Aktau Declaration: "Top-10"

As reported in the 2016 Sustainability Report, the four major oil and gas Operators in Kazakhstan, working with the National Chamber of Entrepreneurs "Atamaken" in the framework of the 2012 Aktau Declaration, have identified ten categories of goods and services as priority areas for local content development. We call this the "Top 10".

In 2017, in light of upcoming tenders, NCOC organized business workshops regarding three of these "Top 10" opportunities, namely: Consumables, Valves Manufacturing and Waste Management. The workshops gave local contractors more information about NCOC's requirements in procurement, prequalification and specifications, and helped them identify ways to strengthen their competitiveness in bidding. Local companies were also introduced to the "Alash" Unified Vendor Database. The workshops were attended by 95 local companies, and international companies looking to partner with them.

As of 2017, NCOC has already awarded 125 contracts to local companies for "Top 10" related goods and services.

8.5. GROWING LOCAL INDUSTRY CAPABILITY

Development of local vendors is a priority. The objective is to help local companies improve their technical and managerial capabilities so that they qualify as potential suppliers to the project, and longer-term could bid on other opportunities in national and international markets.

In the past five years alone, 35 contracts worth four billion dollars, originally executed by international contractors, have been transitioned to competitive local companies – for instance, in helicopter services, marine operations, and freight forwarding.

Since 2006 about 1,200 local companies have participated in workshops and forums organized by NCOC. These range from general awareness seminars to introduce the project and its contracting requirements, to more specialized seminars on tender writing and pre-qualification processes.

From 2006 to 2017, the Operator assisted over two hundred local companies to obtain international standards certifications for their management, goods and services, thus significantly increasing their competitiveness for contracts with NCOC. The Operator has also provided assistance and financial support to local companies to obtain international certifications for their goods and services from the American Society of Mechanical Engineers (ASME) and American Petroleum Institute (API).

From 2006 to 2017, NCOC conducted more than three hundred technical qualification audits and site visits of local companies, assessing their ability to meet demanding specifications and international codes and standards for goods and services put out for bid by the North Caspian Project.

From 2006 to 2017, the Operator provided more than three thousand employees of local companies with specialized professional training in the most in-demand craft skills, on topics such as Working in Confined Spaces, Industrial Welding Safety, Electronic Systems and Assembly, Working at Height, Mobile Crane Operations, etc. *This was a major focus area in 2017; in this year alone NCOC conducted 110 courses and trained a total of more than a thousand Kazakhstani technical professionals.* The training allows local companies identified by NCOC's Local Content Department to improve their skill base and meet requirements imposed by international standards, codes and heavy industry norms in common use today.

8.6. JOB SKILLS TRAINING AND KNOWLEDGE TRANSFER

As a means to achieve its own medium- and long-term nationalization goals, the Operator has developed a special, targeted programme for identifying and recruiting Kazakhstan citizens, and providing them with training for advancement in a long-term career with NCOC.

In May 2017, NCOC Human Resources launched a new "Leadership" programme with the Institute of Leadership and Management (ILM). The programme is targeted at Kazakhstan nationals at two levels: a six-month course for Team Leaders, and a five-week course for Mid-Level Managers. In 2017, 51 employees studied under this programme.

Since 1998 a total of more than 16,000 Kazakhstan citizens have received some form of training, either from NCOC or as employees of local companies being helped by NCOC.

NCOC visits Kazakh-British Technical University in Almaty

On October 6, 2017, an NCOC delegation led by Managing Director Bruno Jardin visited Kazakh-British Technical University (KBTU) in Almaty.

During the visit, University officials described activities of the Maritime Academy, the faculties of Geology and Oil and Gas industry, Center for Corporate Training, Multimedia Technologies, Nanotechnologies and other spheres of the university. Mr Jardin met with students and delivered a lecture on the North Caspian Project. The visit culminated with the signing of a Memorandum of Cooperation between the University and NCOC.

In fact, the history of NCOC's cooperation with KBTU began long ago, with the donation of a wireless internet system in 2010, and the donation in December 2016 of a drilling simulator in the Park of Innovative Technologies in Almaty. (See more about this in the NCOC 2016 Sustainability Report.)



Over two decades, the Operator has spent in total about US\$260 million on job skills and professional training to build local capacity for the North Caspian Project.

8.7. NATIONALIZATION

Article XXVII of the NCSPSA specifies the overall targets in terms of manning levels of Kazakhstan citizens employed in carrying out Petroleum Operations. In 2017, the Kashagan Phase 1 Project has already exceeded these targets, with:

- 75% of managerial staff;
- 97% of technical and engineering employees, administrative staff, and qualified specialists;
- 100% of workers and supporting personnel.

Strong growth was once again noted in Kazakhstani managerial staff in 2017, increasing to 75% compared to 69% last year. This is in connection with restructuring of office and supporting functions (see NCOC Workforce).

The changes in 2017 represent a transformation towards a more efficient, agile production company earning its right to grow and to drive consistent and effective use of NCOC business processes. It established a stronger foundation for aspired NCOC culture and behaviors.



Case Study

Special Thanks to “Special Projects”!

This year, NCOC’s Special Training Project turned 15 years old. Since 2002, Special Projects (SP) have developed Kazakhstan’s young and talented resources into trained, qualified personnel for the production and maintenance operations of the Kashagan Project. Human Resource Business Partner Yerzhan Taskyngali shares his first-hand impressions about SP training.

“Special Projects is a unique training programme targeted at young Kazakhstani graduates. I always say ‘unique,’ because NCOC was the first to do vocational training for young graduates at its own facility, the “Atyrau Training Center (ATC)”, providing transportation and meals, and even paying the trainees!

“Beginning with the first Special Project, more than 1,100 trainees have successfully completed the programme and hired into the Kashagan Project. Today, about 700 SP graduates work in almost all departments of the company.

“I am one of them.”

“In October 2007, I was recruited as an SP-3 trainee. It was the largest recruitment campaign ever. Almost 330 trainees were on-boarded at the same time. The Company brought together young people from all parts of Kazakhstan, so it was a great ‘mix.’

We had English language classes, then Basic Technical Knowledge – introduction to the oil & gas business. The last and most important phase was special disciplines. After each stage, we took tests to pass ‘gates’. Most of us had no idea in what department we wanted to work or what we would do. The main thing was our dream to work on the Kashagan Project. That’s what kept us moving forward to do our best.

I will never forget the day when Francesco Alessi, who was at that time the ATC and Special Projects Manager, came to us and said there was a vacancy at ATC and he would like to consider a trainee for this position. And in June 2009, my dream to work for the Kashagan Project came true – I was hired as a Junior Contract Administrator. This was the start of my career. I was a Team Lead in the Training, Skills and Learning Department of HR Directorate. That’s the department responsible for SP recruitment and organization, so I know – from the inside – how much effort, financial and other resources NCOC invests in the Special Projects training program. Since then I have been promoted and moved to other jobs. Now I’m Business Partner in HR Directorate.

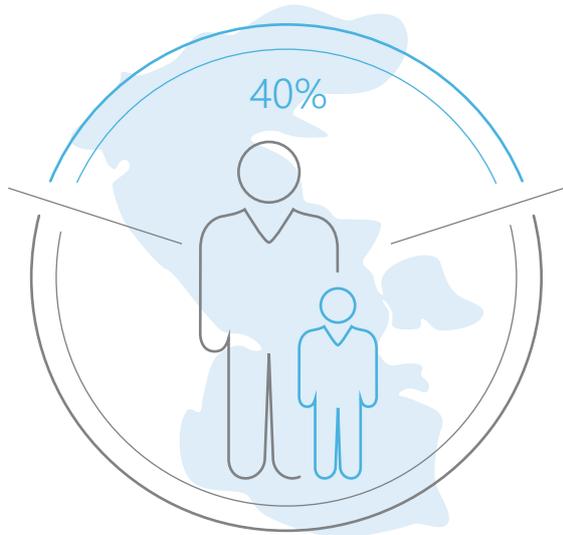
Taking this opportunity, I would like to congratulate all SP graduates on our 15th Anniversary! I want to say that NCOC has given a lot to SP trainees and it’s time to “return the favor” with our performance, using the knowledge that Special Projects has provided us. Personally, I will continue to do my best, and hope that my knowledge, experience and efforts will contribute something to NCOC’s success in reaching its goals, at least at my level.

In conclusion, I would just like to say “Special Thanks” to Special Projects!”

Yerzhan Taskyngali

Business Partner in HR Directorate
Ex-Special Projects trainee





Expatriate employees reduced by 40% in 2015 – 2017

Overall at the end of 2017, 89% of the nearly 3,000 employees of operating company NCOC are Kazakhstan citizens, and 92% of the more than 10,000 people working on the North Caspian Project are Kazakhstan citizens.

8.8. BUSINESS ETHICS

Honesty, integrity and fairness in all aspects of our business is a fundamental principle, and we require the same of all those with whom we do business.

Awareness

NCOC's General Business Principles apply to all our business affairs and describe the behavior expected of every staff member of NCOC, including direct-hire Kazakhstan citizens, secondees and contractor staff.





More Information

More about NCOC's personnel policies and training programmes can be found on our website at www.ncoc.kz, please see page 235 (8).

KazEnergy scholarships programmes can be found at www.kazenergy.com.

Further, all NCOC staff are required to adhere to a Code of Conduct, which instructs them on how to apply the General Business Principles in line with our core values. It provides practical instructions on how to comply with laws and regulations and how to relate to customers, communities and colleagues. Staff communications and monitoring programmes are designed and implemented to assure compliance.

Suppliers

Contractors and suppliers are contractually obligated to comply with our General Business Principles and Code of Conduct in all aspects of their work with us. All those seeking to do business with NCOC undergo third-party "due diligence" background checks before contracts are signed. After further risk screening, some companies may be asked to institute mandatory training or special contractual conditions to ensure that their business practices align fully with our expectations.

Suspected Violations

No one at NCOC may instruct staff to take actions that violate the law or contradict our Principles. If an employee observes such an action or instruction, he or she may refer the situation in confidence to a supervisor, to the NCOC Ethics & Compliance officer, or to the Compliance Hotline for further investigation and possible action. The Compliance Hotline is a 3rd party operated website (<http://www.ncoc.deloitte-hotline.com>), e-mail address (ncoc.hotline@deloitte.kz) and phone number (8 800 080 15 65) that allows anyone to report suspected violations of law and Code of Conduct fully anonymously. It was implemented in 2017.

NCOC staff, vendors, suppliers, contractors or anyone else can raise concerns or report possible non-compliance with our values and principles – even anonymously – to the NCOC Ethics & Compliance officer or to the Hotline. Details are kept confidential. The Ethics & Compliance officer looks into allegations, and if confirmed, the Company's management takes actions appropriate to the circumstances. NCOC does not tolerate retaliation of any kind against those who report an issue concerning our General Business Principles, the Code of Conduct or Anti-Bribery & Corruption Manual, or compliance with applicable law.

8.9. PREVENTING CORRUPTION

NCOC's General Business Principles are clear: the offer, payment, soliciting or acceptance of bribes in any form, direct or indirect, is unacceptable.

Policies

NCOC's internal Anti-Bribery & Corruption Manual contains policies and procedures to ensure that any interaction with government officials is directly related to a stated business purpose or regulatory

requirement, and that it is in strict compliance with the laws of Kazakhstan and consistent with any international statutes that may apply.¹¹

NCOC requires that its staff avoid conflicts of interest between their private activities and their part in the conduct of NCOC business.

NCOC reflects all business transactions in our accounts in an accurate and timely manner, in accordance with established procedures and agreements.

Contractors and suppliers are obligated by their contracts with NCOC to adhere to our General Business Principles in all aspects of their work with us.

As above, concerns or suspected non-compliance may be reported in confidence to the NCOC Ethics & Compliance officer or to the Hotline.

8.10. ENGAGEMENT IN PUBLIC POLICY

In our General Business Principles, NCOC has pledged to contribute in an ethical and constructive way to enhancing the laws and regulations of Kazakhstan on health, safety, security and environmental protection. NCOC is an active member of KazEnergy, a not-for-profit association of companies in energy and oil and gas industries in Kazakhstan. NCOC is a member of the Oil and Gas Committee of the “Atameken” National Chamber of Entrepreneurs. We often engage in discussions of priority public policy issues affecting our industry in the framework of these organizations. NCOC is also a member of the American Chamber of Commerce in Kazakhstan, and has participated in its advocacy activities to improve the foreign investment climate.

NCOC does not make political contributions of any kind.

¹¹ *The US Foreign Corrupt Practices Act (FCPA) and the UK Anti-Bribery Act are two foreign laws that could apply to companies or citizens of those countries, even if their activities take place in Kazakhstan.*



Case Study

Environmental Regulatory Reform

OECD

The Organization for Economic Cooperation and Development (OECD) promotes policies to improve the economic and social well-being of people around the world. The member countries of OECD are the top 35 economies in the world and Kazakhstan, in its Strategy 2050, aspires to join them. The organization itself provides a forum in which member and non-member governments can work together to share experiences and seek solutions to common problems.

In his Address to the Nation on January 31, 2017, President Nursultan Nazarbayev called on his Government to implement the best practices and recommendations of the OECD as part of the "Third Modernization" institutional reform agenda.

Six months later, OECD issued its **Multi-dimensional Review of Kazakhstan (Vol.2)**. The Review is a collaborative programme between the OECD and Kazakhstan that seeks to identify and analyze major constraints to the country's development and make practical policy recommendations.

NCO strongly supports the OECD's recommendation that Kazakhstan undertake broad-based reform of its environmental regulation to align with practices in other economies.

Selected Excerpts from the OECD's "Multi-dimensional Review of Kazakhstan (Vol.2)," published 22 June, 2017

- *On indirect environmental damage payments: "The OECD country experience shows that Kazakhstan should abandon fault-based concepts for damages that tie liability to exceeding a pre-determined limit in an emissions permit and instead adopt the strict liability/polluter-pays model based on evidence of actual harm to the environment."*
- *On financial vs. environmental objectives for government control: "Environmental liability in Kazakhstan remains focused on calculating and collecting monetary compensation for the state (essentially serving as a revenue-raising penalty) rather than on preventing and correcting the damage, reducing emissions over time and incentivising the use of BATs [Best Available Technology]."*
- *Discriminatory taxes and fines for emissions: "The state should eliminate discrimination against specific industrial sectors, set rates for taxes and fines which are uniform for all industry sectors, and set rules for assessing damages which are also non-discriminatory. The rates applicable to taxes and fines should be realistic [and] consistent with international practice..."*
- *The Kazakhstan GHG Emissions Trading System: "...needs additional updates to bring it in line with international markets and prepare the system for future linking... Companies lack the clear ability to comply with the KazETS requirements because of vague rules. Accordingly a risk exists that the KazETS could be reduced to another mechanism for penalising market participants for non-compliance rather than supporting the underlying environmental purposes of the programme."*



This is a win-win for Kazakhstan, improving conditions for foreign investment and better incentivizing environmental protection at the same time.

For years, NCOC and its shareholders have advocated for reform of Kazakhstan's environmental regulations on gas flaring for safety purposes. Oil and gas companies occasionally flare natural gas from processing facilities during unplanned events such as power outages to help control pressures and flows. In contrast to the many countries that view flaring as a necessary safeguard in the event of an emergency, Kazakhstan levies high fines and taxes on it. Other oil and gas companies and investors – supported by KazEnergy and the American Chamber of Commerce – stood with us. In 2016, laws and regulations were changed to allow, for the first time, permitted volumes for unplanned “technologically unavoidable” gas flaring. This was a critical factor in the decision of NCOC investors to proceed with restart of Kashagan production in 2016.

These changes were a step in the right direction, but have not resolved the serious underlying environmental regulatory problems that still deter foreign energy investment:

- The amounts permitted as unplanned “technologically unavoidable” gas flaring during operations are still far less than in other oil and gas producing countries worldwide.
- The distinction between unplanned “technologically unavoidable gas flaring,” and emergency flaring (with permitted volume of zero) remains unclear in practice.
- If the permitted amounts of flaring are exceeded, in Kazakhstan in addition to any fines the company is also obligated to compensate the government for ‘damage’ to the environment, automatically, without need for evidence that any actual damage has been caused. This is at odds with fundamental legal principles in most OECD regulation.

NCOC believes there is little environmental justification for this approach: emissions from incident flaring are insignificant overall because incidents are infrequent, and are foreseen in environmental impact assessments. And the government says it maintains a separate tax rate for the oil and gas industry – tens of times higher for flaring than for other stationary sources of exactly the same air emissions – for fiscal reasons tied to revenue targets.

The Government of Kazakhstan has already taken action in late 2017 to tackle these questions, forming a working group with the OECD that may progress toward an integrated Concept for fundamental reform of the Environmental Code by the end of 2018. Alongside other businesses in Kazakhstan, NCOC and its shareholder investors look forward to adding their voices to the discussion.



9. SOCIAL PROGRESS

9.1. ENGAGEMENT WITH THE LOCAL COMMUNITY

NCOC is proud to call Atyrau its home. Nearly 3,000 NCOC employees, and thousands more contractors and suppliers who work for the Kashagan Phase 1 Project, are residents of communities in Atyrau and Mangystau Oblasts.

NCOC is headquartered in Atyrau, close to the North Caspian Project's resources and its facilities in Atyrau and Mangystau Oblasts. We aim to be an employer of choice and a respected member of these communities. We care about the communities where we operate because we are a part of them. We want to proactively address any concerns raised about our operations, recognizing that public respect and confidence are earned through performance, open communications and community involvement. Voluntary sustainability reporting plays an important part in this.

Through its Sponsorship and Donations Programme, NCOC positions itself as a socially responsible company that supports local communities.

NCOC actively participates in various campaigns aimed at supporting vulnerable sections of the population. For example, the annual national campaign "Road to School", which supports children from the low-income population of Atyrau and Mangystau Oblasts by providing school supplies.

NCOC also supports children with disabilities, organizing holidays dedicated to "Children's Protection Day", New Year's Day, and much more. Such events help children with disabilities to socialize and feel themselves a part of community, to help in their development and eliminate barriers to communication.





NCOC Contributions

NCOC organized a series of handover events in Makat district and in Atyrau as part of its Sponsorship and Donations Programme.

On June 13, the Company donated a specially-modified Gazel minibus to the Makat District Society for the Disabled. The Makat District Akim, officials of the Social Protection Department, veterans and members of the Society participated during the event and thanked NCOC for the donation.

Another handover took place in Atyrau the next day, including the donation of similar specialized minibus to the "Bolashak K" Foundation, and a minibus to the polyclinic in the Geolog village near Atyrau. This vehicle will be used mainly as a medical service transport for the inhabitants of Karabatan settlement and other communities around Bolashak plant.

NCOC is a general sponsor of Expo-2017



NCOC encourages employees to take active part in the betterment of their communities.

- Since 2016, NCOC has organized a clean-up campaign of the Ural River bank called "Clean city Atyrau", jointly with local environmental NGOs.
- NCOC continues to sponsor a week-long Environmental Summer School. In it, students engage in research and practical activities in environmental studies that promote the development of sustainable development ideas in the Caspian Region. The Summer School is held about the time of the annual "Caspian Day" commemoration in August.
- NCOC has launched a Road Safety Awareness Initiative in Atyrau Oblast, providing road safety education and helpful tips for school children at five schools near high-traffic areas. The children were also given various wearable items with high-reflectivity materials that will increase their visibility to drivers in dark hours.
- In 2017 we continued to engage on a regular basis with the local authorities of the communities around the Bolashak plant (Karabatan station, Eskene station and Taskesken). This has helped us to better understand their concerns and social needs. NCOC learned of the long commutes children in these communities make to the Sharipov Boarding School in Dossor (Makat District), and to the Besikti Village School (Atyrau City), as well as the urgent need for public transportation to the nearest polyclinic in Atyrau. NCOC and local authorities worked together to donate new, safer and more comfortable buses for these communities in 2017.



- NCOC and its employees also take part in holidays and other events important in the life of the community, such as Nauryz and Victory Day.

We engage on a regular basis throughout the year with the public to share information or discuss their concerns and questions about the North Caspian Project. For example, NCOC presented its 2016 Sustainability Report to the public and answered questions at three special meetings in 2017. The first was held at the Atyrau Oil and Gas conference in April. Another event for the general public was held in Atyrau on May 5, moderated by Galina Artyukhina, the Executive Director of the Kazakhstan branch of the World Business Center for Sustainable Development, and Shynar Iztelevova, Director of Zhayik Aarkhus Center. The third event was held on June 2 for the general public in Aktau, led by Zhaxygul Makhanbetova, Director of the “Youth’s Achievements” Community Fund.

NCOC has a broad-ranging communications programme to reach out to stakeholders on topics of interest. We actively work with local media outlets and regularly update the NCOC website. To help local businesses learn about economic opportunities associated with the North Caspian Project we reach out in a variety of ways, from general awareness seminars about the Project and participation in industry conferences, to highly targeted vendor audits and specialized training sessions. See the section on Local Content for more information.

Anyone in the community can raise concerns or report possible non-compliance with our values and principles – even anonymously – to the NCOC Ethics and Compliance officer, or to the Compliance Hotline that was instituted in 2017. See the section on Business Ethics for more information.

9.2. NCOC WORKFORCE. LABOR RIGHTS

NCOC aims to be an employer of choice in Kazakhstan.

NCOC goes well beyond legal requirements in providing compensation and benefits that are competitive and worthy of the skilled and motivated workforce we seek to attract. NCOC carefully calibrates the competitiveness of its salary and benefits package with market surveys. NCOC conducted employee satisfaction surveys in 2017, and will continue in 2018 in order to measure employee engagement and

opinions about Company compensation and benefits, work environment, management, career growth and other topics. The results will inform an enhanced Compensation and Benefits system that is planned for implementation in 2018.

In fourth quarter 2017 NCOC carried out a restructuring of office and support functions in Atyrau in connection with completion of project and drilling work. The changes eliminated duplications and realized efficiencies arising from the 2015 merger of four “agent” companies into NCOC. The changes had been postponed to allow NCOC to focus on the safe restart of Kashagan field in 2016.

This streamlined structure is another step toward becoming an employer of choice, by giving local employees greater responsibilities earlier in their career. The objective is to facilitate the process of nationalization and further reduce expatriate expert personnel. See also the section on Nationalization.

Diversity and Inclusion

NCOC does not tolerate unlawful discrimination in employment. Our Code of Conduct for employees specifies that employment decisions are based only on relevant qualifications, merit, performance and other job-related factors.

NCOC does not tolerate any form of harassment, nor any action, conduct or behavior which is humiliating, intimidating or hostile. Managers have a responsibility to protect their staff from harassment, and to create a climate where individuals who have concerns about harassment in their work area may discuss the issues in confidence.

NCOC is committed to providing an open working environment in which respect for each other is fundamental, continuous improvement is a shared goal, and the concerns of individuals are taken seriously and dealt with positively, without prejudice to them or their career.

In 2017, 33% of NCOC’s workforce are women.

In 2017, two women joined the NCOC Senior Leadership Team.





Workforce Grievances

NCOC has clear policies and procedures for dealing with workforce grievances, which apply equally to its contractors and sub-contractors. Grievance procedures serve to bring employee problems to management's attention and ensure open, proper and timely review and resolution before frustrations can evolve into conflict. Employees may express their grievances freely and openly without fear of dismissal and intimidation. NCOC must accept, register and review any written grievance submitted by an employee. Employees have the right to appeal any decision. If not resolved within NCOC, the grievance may be referred to appropriate RoK officials. By law, neither NCOC nor its contractors may compel employees to join or not join a legal labor action, and must reserve for the employee any prior job position and benefits.

NCOC has policies and procedures in place for monitoring timeliness of salary payment, living conditions and canteen facilities provided by our contractors and sub-contractors.

9.3. HUMAN RIGHTS DUE DILIGENCE

NCOC has been working for many years to promote respect for human rights within our organization. Our approach consists of several core elements, including:

- Compliance with applicable laws and regulations;
- Regular dialogue and engagement with our stakeholders;
- Contributing, directly or indirectly, to the general well-being of the communities within which we work;
- Adherence to our General Business Principles, the Code of Conduct, and the Anti-Bribery & Corruption Manual, which address related issues.

As it relates to our staff, this approach manifests as compliance with law, protection of employees' personal data, respect for diversity and continuous improvement of our Human Resources



programmes and policies (see section on NCOC Workforce). Suppliers are also contractually obligated to comply with our General Business Principles and Code of Conduct in all aspects of their work with us.

Security

NCOC has programmes and measures in place to provide security and safeguards as appropriate to protect its people, operations, facilities, business information and other assets. NCOC sites have implemented security programmes based on a proven, structured risk assessment methodology. NCOC complies with relevant laws and regulations affecting security in areas where we operate, and we support a coordinated and cooperative approach to infrastructure security with the competent local and national security agencies.

NCOC requires its security contractors to abide by the Voluntary Principles on Security and Human Rights.

Ransomware Attack in 2017

On May 12, 2017, NCOC was one of many companies around the globe that was impacted by the WannaCry ransomware attack. Oil production was not affected, and there were no safety issues. The virus attacked a number of office computers and some servers. Quick action by the Company's information technology (IT) specialists helped contain the spread of the ransomware. The servers were backed up. Data was recovered and the systems were back to normal in a short time. NCOC's protection system was able to detect the threat but did not prevent this attack. NCOC's IT department has worked with Microsoft on ways to improve our defenses in future. NCOC has also undertaken a Cyber Defense Initiative focusing on prevention, including process changes, vulnerability assessments, network security and the promotion of a cyber-security culture among employees.



10. REPORTING PROCESS

10.1. PRINCIPLES

NCOC reports sustainability performance in a full and transparent manner to its stakeholders in compliance with its General Business Principles, and subject to relevant terms of the North Caspian Sea PSA.

This report is guided by global best practice; foundational is the 3rd edition (2015) of “Oil and Gas Industry Guidance on Voluntary Sustainability Reporting” (“the 2015 Guidance”). Our intent is that, through strict adherence to its indicators and processes, this report will be relevant, transparent, consistent/systematic, complete and accurate in the sense defined by the 2015 Guidance. The data is fully consistent with reports on environmental and socio-economic performance of the North Caspian Project made to NCOC shareholders, and to the Republic of Kazakhstan in its oversight and regulatory capacities.

10.2. MATERIALITY

A Materiality analysis was conducted, in accordance with the IPIECA 2015 Guidance.

Identification

The base set of reporting indicators are those in the pilot 2015 NCOC Sustainability Report, based on “common” reporting requirements of the IPIECA 2015 Guidance. Stakeholder engagements, issues monitoring and media inquiries were also used to identify potential material issues specific to this Project.

Prioritization

The frequency with which stakeholders raise certain issues and the volume of response material in our databases, media coverage, and considerations of timeliness are criteria which have all influenced the prioritization of issues and inclusion herein. The structure of the report has been evolved from the 2015 Guidance’s illustration of the interconnecting social, economic and environmental dimensions of sustainable development, reproduced as a figure in the Report Structure section.

10.3. DATA PROTOCOLS

For more than a decade, the Operator has had robust management and other systems in place for collecting and analyzing environmental, safety, production and financial activity, and reporting it to the shareholders of the North Caspian Project, as well as to the PSA Authority and RoK government agencies at various levels for oversight and regulatory compliance submissions. This report uses the same data sources and reports provided to them. If there is a difference (e.g., in units or definitions) between reporting requirements of the 2015 Guidance and those of Republic of Kazakhstan, we are governed by the latter and attach a footnote to the Performance Table.

10.4. EXTERNAL ADVISORY BOARD



**Shynar Ormanbekovna
IZTELEUOVA**
Atyrau

Director of Zhayik Caspian Aarhus
Centre



**Galina Viktorovna
ARTYUKHINA**
Almaty

Executive Director of Kazakhstan
Business Council for Sustainable
Development (BCSD Kazakhstan)

Editor-in-chief of *Ecology and Industry
of Kazakhstan* magazine

National expert on environment
protection, green economy and
sustainable development in the
Republic of Kazakhstan



**Kirill Vladimirovich
OSIN**
Aktau

Director of *Eco Mangistau* NGO

Civil leader in environment protection,
eco-tourism development and
volunteer movement



**Galina Khristoforovna
CHERNOVA**
Atyrau

Chairman of NGO *Globus Centre*
for Environmental Law Initiative

Initiator of public monitoring and
public examination of social and
investment projects carried out by
investors in Atyrau Oblast



**Zhibek Kuangaliyevna
BISENOVA**
Atyrau

Paediatrician, rehabilitation physician

Founder of *BolashakK* Public Fund

Director of *BolashakK* Rehabilitation
Centre



**Aigerim Senbekovna
SHILIBEKOVA**

Atyrau

First Vice Rector of Atyrau
State University after Khalel
Dosmukhamedov

Doctor of Philosophy in Political
Science with specialization in
regional security in Central Asia,
including environmental aspects of
Kazakhstan's national security



**Zhaksygul Shakhzadayevna
MAKHANBETOVA**
Aktau

Director of *Zhastar Zhetistikteri*
Public Fund

Founder of Civil Alliance
of Mangistau Oblast for civil society
development

Beginning in 2017, per public suggestion, NCOC convened an External Advisory Board in order to obtain direct stakeholder input on the Sustainability Report. The Council, led by Shynar Izteleouva of the Zhayik Aarhus Center in Atyrau, combined the input of environmental and social NGOs from Atyrau and

Mangystau Oblasts, and an “at-large” member from elsewhere in Kazakhstan. NCOC met several times with the Board in Atyrau and Aktau to receive comments and recommendations on the 2016 report, and on the draft 2017 report. As a result, NCOC incorporated many stakeholder recommendations, including the provision of more information on waste recycling, “intensity” metrics “per tonne of crude oil equivalent” for GHG, water and energy use, a full list of implemented Social Infrastructure Projects in 2017, and greater use of web-based reference material from previous Sustainability Reports. NCOC and the EAB marked the positive experience of drafting the report in cooperation. The joint discussions helped to highlight the positive moments of NCOC activities in environmental and social area as well as the issues that require more attention and improvement.

10.5. ASSURANCE

For more than a decade, NCOC’s data gathering and reporting systems have been subjected to a variety of audits and “cold eyes” reviews by shareholders, and inspections or reviews by the relevant governmental regulatory agencies.

Reported inventory of direct GHG emissions for 2017 were verified in compliance with RoK legislation by EnEco Solutions (Uralsk, Kazakhstan).

NCOC holds the following certifications:

- OHSAS:2007 (Occupational Health & Safety Management Systems)
- ISO:2004 (Environmental Management Systems)
- ISO:2008 (Quality Management Systems)

The external verification for these awards requires NCOC to regularly demonstrate not only compliance, but also continuous improvement in its management systems.

10.6. TABLE OF CORRESPONDENCE TO IPIECA INDICATORS

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MORE INFORMATION

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- **Detailed description of Project challenges**
NORTH CASPIAN OPERATING COMPANY / ABOUT NORTH CASPIAN PROJECT / PROJECT CHALLENGES
- **Sulfur Management (Case Study)**
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- **General Business Policy on Health, Safety, Security & Environment**
NORTH CASPIAN OPERATING COMPANY / CARING-FOR-THE-ENVIRONMENT
- **“Lead2Safety”**
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- **“Golden Rules”**
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- **Root Cause Analysis**
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- **“SAFE-R” Reporting**
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- **“GRuVIS,” the Golden Rule Visible Implementation System**
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- **“Tool Box Talks”**
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- **Environmental Impact Assessments**
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- **Baseline studies and monitoring**
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- **Caspian Zero Discharge policy**
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- **Bird surveys**
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- **A brief history of biodiversity preserves in the North Caspian**
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- **Saiga tagging**
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- **Protected Nature Areas**
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SUSTAINABILITY / SUSTAINABILITY REPORT 2016 / ENVIRONMENTAL STEWARDSHIP / NON-GHG AIR EMISSIONS
- **“No Routine Flaring” policy**
SUSTAINABILITY / SUSTAINABILITY REPORT 2016 / ECO-EFFICIENCY / FLARING
- **Case Study Bolashak Emissions Safety (2016)**
SUSTAINABILITY / SUSTAINABILITY REPORT 2016 / ENVIRONMENTAL STEWARDSHIP
- **What is H₂S?**
SUSTAINABILITY / SUSTAINABILITY REPORT 2016 / ENVIRONMENTAL STEWARDSHIP

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- **Description of NCOC approach to oil spill response preparedness**
PUBLICATIONS / OIL SPILLS PREPAREDNESS AND RESPONSE
- **NCOC leadership in the Oil Spill Preparedness Regional Initiative (OSPRI)**
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- **Oil spill response equipment**
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- **NCOC 2010 Oil Spill Response brochure**
PUBLICATIONS / OIL SPILLS PREPAREDNESS AND RESPONSE
- **Caspian Monitoring Book**
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- **Local Content Policy**
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- **Supplier Qualification**
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- **Local Content brochure (2016)**
PUBLICATIONS / LOCAL CONTENT IN KASHAGAN 2014
- **“Good Neighbor” brochure (2012)**
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- **Description of the 2012 Aktau Declaration**
NCOC / ECONOMICS BENEFITS TO KAZAKHSTAN / LOCAL CONTENT / INDUSTRY DEVELOPMENT
- **Early Tenders (Case Study)**
SUSTAINABILITY / SUSTAINABILITY REPORT2016 / SOCIO-ECONOMIC / GROWING LOCAL INDUSTRY CAPABILITY

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- **General Business Principles**
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- **Code of Conduct**
ETHICS & COMPLIANCE
- **Types of training offered by NCOC**
SUSTAINABILITY / SUSTAINABILITY REPORT2016 / SOCIO-ECONOMIC / JOB SKILLS TRAINING AND KNOWLEDGE TRANSFER
- **Drill-Sim 5000 at KBTU**
SUSTAINABILITY / SUSTAINABILITY REPORT2016 / SOCIO-ECONOMIC / JOB SKILLS TRAINING AND KNOWLEDGE TRANSFER



Осы есеп басылған қағаздың экологиялылық, функционалдылық және сапа салаларындағы ең жоғары стандарттарға сәйкестігі EU Ecolabel № SE/011/01 белгісімен расталған. Бұл қағазды қоршаған ортаға зиян келтірмей оңай кәдеге жаратуға болады, сонымен қатар ол қайта пайдалануға жарамды. Қағаз өндіру үшін қолданылатын шикізат қоршаған ортаға зиянсыз түрде заңды көздерден алынған.

Бумага, на которой напечатан этот отчет, соответствует самым высоким стандартам в области экологичности, функциональности и качества, что подтверждено сертификатом EU Ecolabel № SE/011/01. Она легко утилизируется, не нанося вреда окружающей среде, а также пригодна для вторичного использования. Сырье для изготовления бумаги получено из легальных источников без ущерба окружающей среде.

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Кері байланыс

“НКОК” компаниясының 2017ж. бойынша тұрақты даму есебіне қатысты ұсыныс пен сұрақтарыңыз болса, SustainabilityReport@ncoc.kz электрондық поштамызға жолдауларыңызды сұраймыз.

Норт Каспиан Оперейтинг Компани Н.В.

Қазақстан Республикасы, 060002,
Атырау қаласы, Смағұлов көшесі 1, НКОК кеңсесі

Обратная связь

Мы будем признательны, если вы отправите свои комментарии и вопросы касательно отчета НКОК по устойчивому развитию за 2017 год на наш электронный адрес: SustainabilityReport@ncoc.kz

Норт Каспиан Оперейтинг Компани Н.В.

Республика Казахстан, 060002,
г. Атырау, ул. Смагулова 1, офис НКОК

Feedback

We appreciate your comments and questions regarding NCOС Sustainability Report 2017 – please contact us at SustainabilityReport@ncoc.kz

North Caspian Operating Company N.V.

1, Smagulov Street, NCOС office,
060002, Atyrau, Republic of Kazakhstan