North Caspian Operating Company N.V. (NCOC)

# SUSTAINABILITY REPORT 2016

# TABLE OF CONTENTS

When you see this symbol (left) anywhere in the Report, it indicates that additional content is available on the Internet at the web address shown on the Links page (p.52).

# 1. NCOC'S COMMITMENT TO SUSTAINABLE DEVELOPMENT – A MESSAGE FROM THE MANAGING DIRECTOR

It has been a year of achievement for the North Caspian project and its Operator, NCOC, capped by a visit on December 7 from the President of the Republic of Kazakhstan to mark the long-awaited start of commercial production from the Kashagan field. This has been our main objective over several preceding years of intensive work and I am pleased to say it was accomplished with safety for our people, the environment and the community. You will find more information about this in the report you are now reading.

Last year for the first time we issued a Sustainability Report in compliance with maturing global best practice[1] as a "continuous improvement step" in our overall commitment to sustainability. This year, we continue the reporting as a regular feature of our responsibility to communicate transparently and openly to the local community and the people of Kazakhstan about our performance in developing their offshore resources.

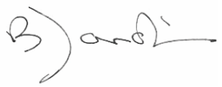
In presenting last year's report to the public, some asked why we need a Sustainability Report. As we continue to report consistently on an annual basis, I believe it will become clear that its value lies in summarizing and presenting the most important data in a way that can be compared from year to year, allowing the public to monitor long-term trends in our performance, using indicators that are important in understanding the sustainability of our project's benefits to Kazakhstan and its people.

We join an increasing number of companies in Kazakhstan reporting performance in this way, and we hope it leads to a better understanding of the contribution our industry makes in meeting the needs of the present generation without compromising the ability of future generations to meet their own needs – the balancing of short- and long-term interests and integration of environmental and social considerations into decision-making that is the heart of our concept of sustainability.

I look forward to continuing the dialog with you, our stakeholders, regarding this report and our performance in general.

NCOC Managing Director

Bruno Jardin



[1] This report complies with the recently-updated "Oil and Gas Industry Guidance on Voluntary Sustainability Reporting" (3rd edition, 2015), developed jointly by IPIECA (the global oil and gas industry association for social and environmental issues), IOGP (the International Association of Oil and Gas Producers) and API (the American Petroleum Institute).

# 2. ABOUT THE NORTH CASPIAN PROJECT

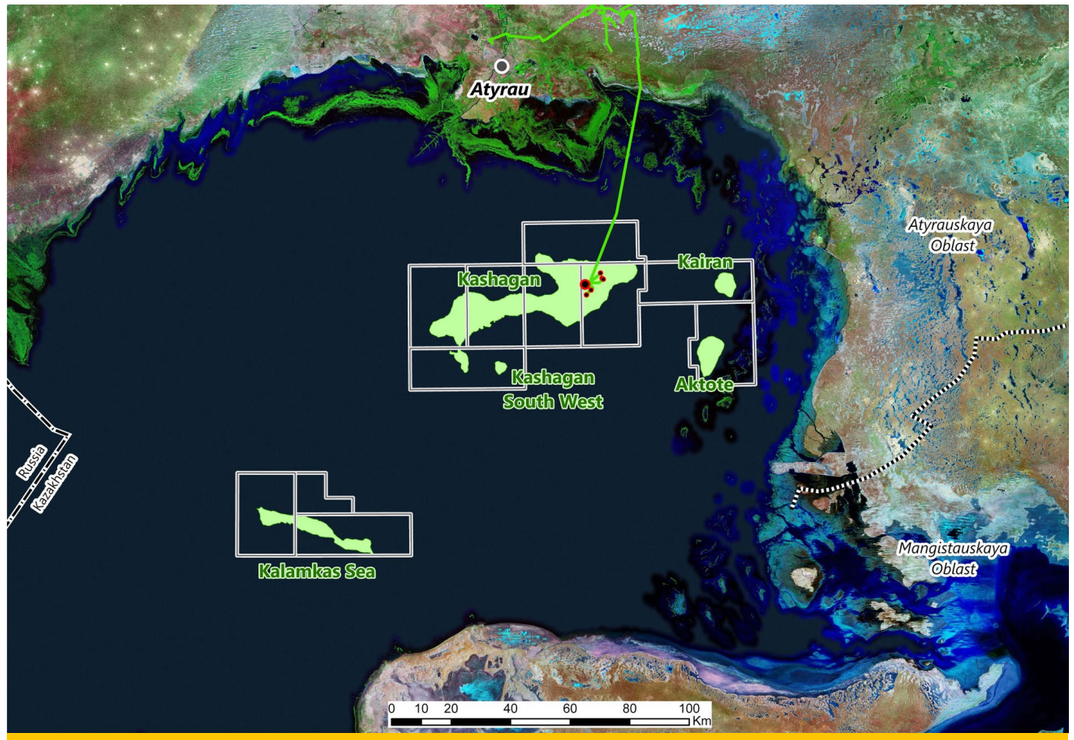
## 2.1 Project Description

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

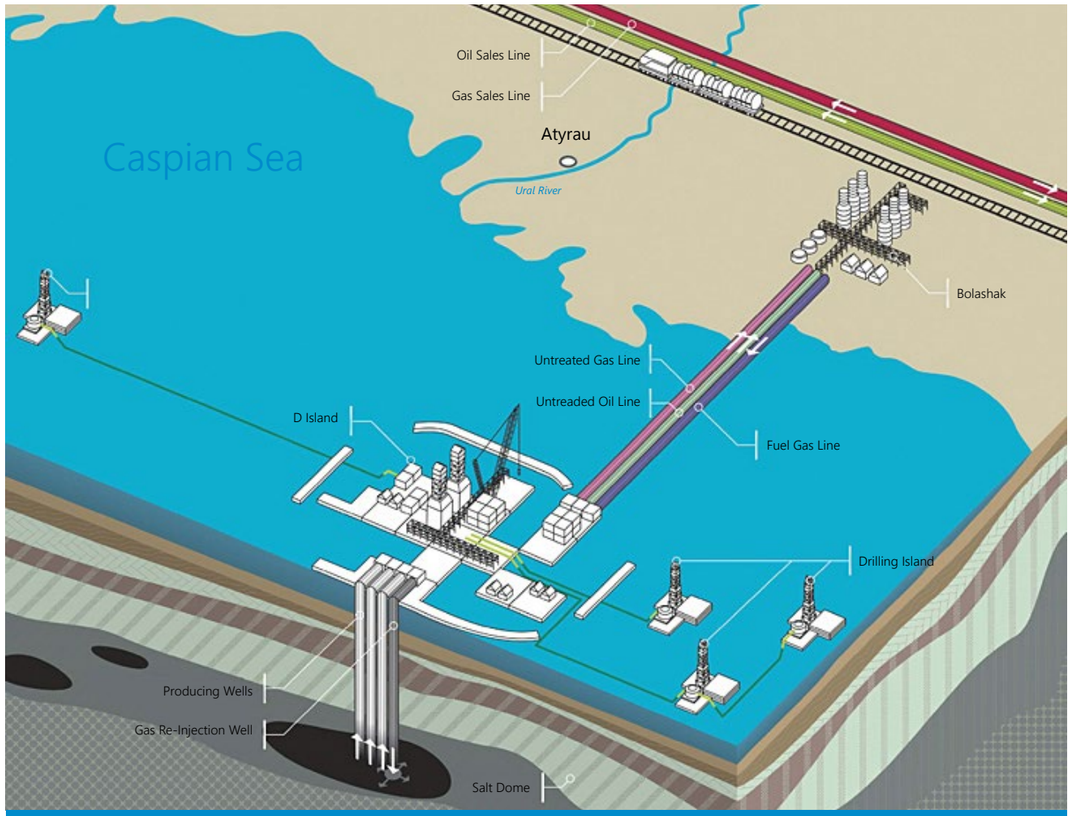
*For more detailed description of project challenges, see www.ncoc.com [a]*

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 meters of water, and more than 4 km deep (4200 meters).

The fluid now 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 (almost 800 bar), and a high concentration of hydrogen sulfide ($H_2S$), making the gas "sour". A positive feature is that gases at that pressure, when re-injected, can actually enhance oil recovery. So the light, gaseous components will be separated from the heavier oil offshore on D-Island and most of it re-injected under high pressure back into the reservoir, into the same rock formation from which it was produced. The remainder of the gas will be sent to the Bolashak onshore processing facility where hydrogen sulfide is removed from the "sour" gas. The processed, or "sweetened," gas will be used for onshore and offshore power generation and some will be marketed as Sales Gas.




*NCSPSA contract area*




*Kashagan development concept*

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 currently being developed anywhere in the world.

Given its scale and technical complexity, the North Caspian project will be developed in phases. Kashagan Phase 1 began commercial production in 2016. The estimated cost of Phase 1 is about US$55 billion. Future phases of development are currently in various stages of planning, as described below.

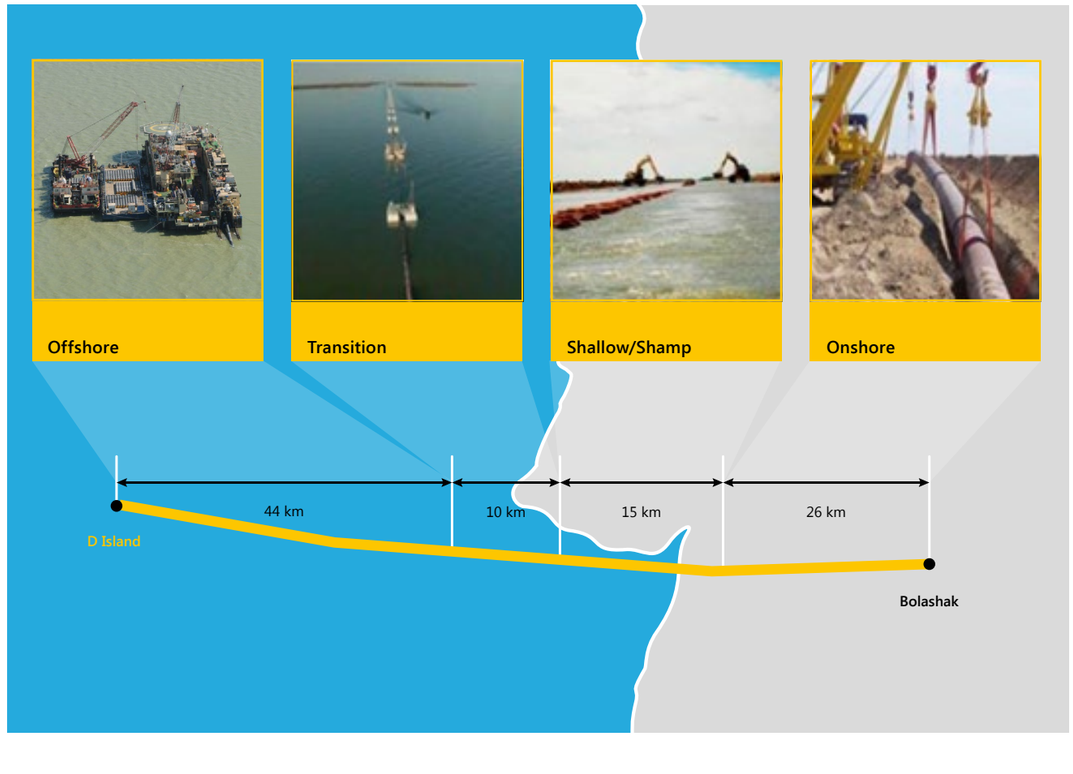
## 2.2 Future Phases

In November 2016, NCOC received approval from the RoK Government to start early engineering and design work toward a future expansion of Phase 1 production at Kashagan. The project, called CC01 ("compression center number one"), will increase production by 80 thousand barrels per day by installing additional raw gas compression and injection capacity offshore, growing Phase 1 production capacity at that time to a target level of 450 thousand barrels per day. The Government's approval allows NCOC to progress early engineering and design work in 2017, and to develop plans for further engineering and design work in 2018.

Furthermore, NCOC is studying the potential co-development of its Kalamkas-Sea field and CMOC's nearby Khazar field. Together these two fields have recoverable reserves of 67 million tonnes of oil and 9 b.c.m. of gas. We hope that the cost savings that can be achieved by the joint development of these fields will make their development economically viable, and if so possibly also unlock the development of other fields in the Mid-Caspian.

Development of other fields is still in the assessment phase.


*RoK President Nursultan Nazarbayev honored the project and its workers and veterans with a personal visit to Atyrau on December 7, 2016*




## 2.3 2016 Activities

A project to replace two 28-inch pipelines approximately 95 km long, from D-Island to the onshore processing facility at Bolashak, commenced in spring 2015 and was completed ahead of schedule in August 2016.

On 28 September, 2016, NCOC reopened the first wells on A Island, restarting the program of testing and commissioning production facilities.

The RoK Ministry of Energy announced that the first batch of oil for export from the Kashagan field was dispatched on 14 October, 2016.

All drilling work for the first phase was completed in 2016. A total of 52 exploration, appraisal and production wells have been drilled since the start of the project.

In addition, topsides work is ongoing on the islands adjacent to D Island (EPC-2 and 4). On December 17, EPC-3 commissioning was completed ahead of schedule.

### Near-Term Outlook

At the end of 2016, production was ramping up to a capacity of 180,000 barrels per day, with steady operation demonstrated at 160,000 barrels per day. Once associated (sour) gas reinjection is started up and optimized, Kashagan Phase 1 is expected to reach production capacity of 370,000 barrels per day by the end of 2017.

*See "Kashagan Boy" [b]*


- Kazakhstan Caspian Transportation System (planned)
- Atyrau - Samara
- Baku – Tbilisi – Ceyhan
- Caspian Pipeline Consortium
- Atyrau – Alashankou

1. Georgia
2. Armenia
3. Azerbaijan

## 2.4 Export Options

Current potential routes for oil export are:

- Westbound: Atyrau-Novorossiysk (via Caspian Pipeline Consortium)
- Northbound: Atyrau-Samara (connection to Russian Transneft system)
- Eastbound: Atyrau-Alashankou

In 2016, North Caspian project shareholders agreed on a commercial framework to sell gas that is not re-injected or used in the facilities. Sales gas is shipped through a dedicated pipeline to Makat and then via KazTransGas infrastructure. Sulfur will be shipped by rail. Each shareholder is independently responsible for transporting and marketing its own share of production.



## 2.5 NCOC Governance and Management Systems

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

Today, that consortium includes seven of the world's largest and most experienced energy companies: KMG, Eni, ExxonMobil, Shell, 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.

*Link to "History in Milestones" on NCOC's website* [c]

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)[2]. In addition to efficiency, the transition better positions the project for asset transfers, and for future phase developments within the NCSPSA area. The top executive officer of NCOC is the Managing Director.

To ensure company systems and processes meet the highest international standards, NCOC holds the following certifications:

- OHSAS 18001 (Occupational Health & Safety Management Systems)
- ISO 14001 (Environmental Management Systems)
- ISO 9001 (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. Certifications were renewed effective 11 January, 2016.

[2] 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.

# 3. NCOC PERFORMANCE DATA

| | 2015 | 2016 |
|---|---|---|
| **PRODUCTS** | | |
| Oil Production (million tonnes) | 0 | 0.96 |
| Sales Gas Produced (million standard cubic meters) | 0 | 211 |
| • *Sales Gas Produced (in million oil equivalent tonnes[3])* | *0* | *0.16* |
| Sulfur Forming for Export by Rail (thousand tonnes) | 0 | 0 |
| • *Sulfur in temporary storage, year-end (thousand tonnes)* | *0* | *125* |
| **HEALTH AND SAFETY** | | |
| OCCUPATIONAL INJURY AND ILLNESS | | |
| • Total Recordable Injury Rate (TRIR), per million man-hours | 0.79 | 0.81 |
| • *NCOC Employees* | *0.50* | *0.86* |
| • *Contractors* | *0.88* | *0.80* |
| • Lost Time Injury Rate (LTIR), per million man-hours | 0.30 | 0.29 |
| • *NCOC Employees* | *0.34* | *0.57* |
| • *Contractors* | *0.26* | *0.22* |
| • Fatalities | 0 | 0 |
| • Fatal Accident Rate, per million man-hours | 0 | 0 |
| • Fatal Incident Rate, per million man-hours | 0 | 0 |
| Number of Process Safety Tier 1 Events (per API RP 754[4]) | 0 | 0 |
| Number of Process safety Tier 2 Events (per API RP 754) | 0 | 1 |
| **ENVIRONMENT** | | |
| GREENHOUSE GAS EMISSIONS | | |
| • Direct (Scope 1), thousand $CO_2$-equivalent tonnes[5] | 465.0 | 1395 |
| • *Carbon dioxide ($CO_2$), thousand tonnes* | *461.5* | *1384* |
| • *Methane ($CH_4$), thousand $CO_2$-equivalent tonnes* | *1.0* | *6.2* |
| • *Nitrous oxide ($N_2O$), thousand $CO_2$-equivalent tonnes* | *2.5* | *4.7* |
| • Indirect (Scope 2, imported energy), $CO_2$-equivalent tonnes[6] | 10.1 | 10.3 |
| • GHG intensity, CO2-equivalent tonnes per 100 equivalent tonnes of oil produced | N/A | N/A |

[3] One million standard cubic meters of gas is taken as provisionally equivalent to 0.0013 tonnes of crude oil.

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

[5] The Global Warming Potential multipliers used to calculate $CO_2$ equivalence are 21 for $CH_4$ and 310 for $N_2O$, using 100-year time horizons, based on RoK Ministry of Environmental Protection Order № 280-e(p) 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 regulations, and consistent with the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

[6] Calculated from indirect electricity consumption using a demand-side emission factor of 0.995 tCO2-eq/MWh for Kazakhstan grid (combined margin) in 2015, 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.



| | 2015 | 2016 |
|---|---|---|
| ENERGY USE | | |
| • Total, million gigajoules (GJ)[7] | 10.6 | 14.0 |
| • Energy intensity, million GJ per million equivalent tonnes of oil produced | N/A | N/A |
| • Total energy exported (imported) by NCOC, million GJ | (0.10) | (0.11) |
| Hydrocarbon Flaring, standard[8] million cubic meters | 6.3 | 129 |
| FRESH WATER | | |
| • Total volume withdrawn, thousand cubic meters | 384 | 1014 |
| • Total generated from seawater, thousand cubic meters | 106 | 112 |
| • Total volume consumed, thousand cubic meters | 444 | 1126 |
| • Freshwater intensity, tonnes of water consumed per equivalent tonne of oil produced | N/A | N/A |
| CONTROLLED DISCHARGE TO SURFACE WATER | | |
| • Hydrocarbons, metric tons | 0 | 0 |
| AIR EMISSIONS | | |
| • Volatile organic compounds (VOCs) emitted, metric tons | 395 | 637 |
| • Sulfur dioxide ($SO_x$) emitted, metric tons | 131 | 56 408 |
| • Nitrogen oxides ($NO_x$) emitted, metric tons | 943 | 1430 |
| SPILLS TO THE ENVIRONMENT | | |
| • Number of spills >1 bbl reaching environment | 0 | 0 |
| • Volume of hydrocarbons (oil) spilled, metric tons | 0 | 0 |
| WASTE | | |
| • Total quantity of waste disposed, metric tons | 22,523 | 23,205 |
| • *Of which classified as hazardous by local regulation, metric tons* | 19,882 | 12,090 |
| **SOCIO-ECONOMIC** | | |
| NATIONALIZATION OF NCOC WORKFORCE[9] | | |
| • *Percentage of national employees in management* | *63* | *69* |
| • *Percentage of national employees in technical and engineering positions* | *95* | *96* |
| • *Percentage of national employees in worker and support positions* | *100* | *100* |
| Composition of NCOC Workforce, percent women employees | 33 | 33 |
| Cumulative number of Kazakhstan citizens receiving NCOC-sponsored training, thousands | 15 | 15 |
| Cumulative payments to local suppliers for goods, works and services[10], billion U.S. dollars | 12.6 | 13.3 |
| Cumulative direct contribution to social infrastructure and community donations, in Atyrau and Mangystau Oblasts, million U.S. dollars | 500 | 525 |

[7] 1 megawatt-hour (MWh) = 3.6 gigajoules (GJ). Method of calculation was modified in 2016 to conform to IPIECA 2015 Guidance by including all primary energy sources based on fuel use; 2015 numbers have been updated accordingly.

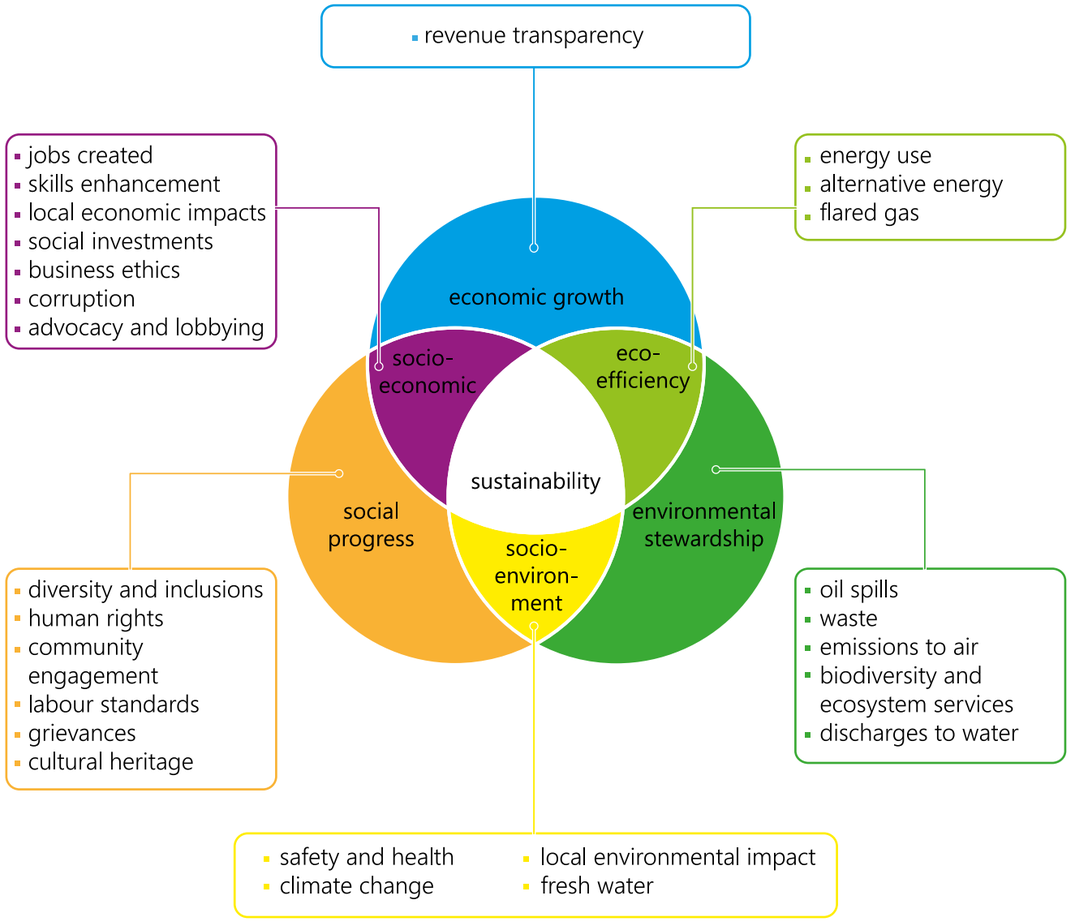
[8] Standard cubic meter at 20°C and pressure 1 atm. The format for reporting amounts flared is established in RoK Government Decree № 1104 of 16 October 2014.

[9] 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. Figures for 2015 in this table have been updated from the 2015 Sustainability Report for consistency.

[10] 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.**

# 4. REPORT STRUCTURE

Narrative reports on NCOC performance are divided into six different 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 IPIECA guidelines (3rd ed., 2015) and our analysis of issue materiality. See page 50 (Reporting Process) for more detail.






# 5. SOCIO-ENVIRONMENT

## 5.1 Health and Safety

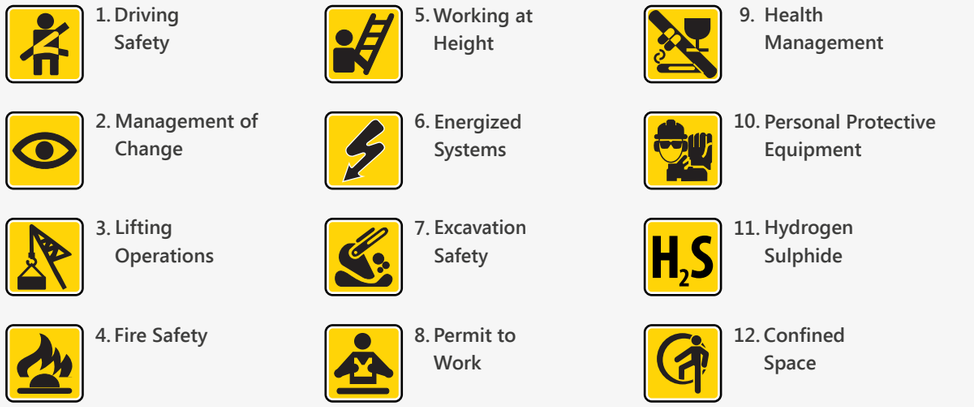
*Health and safety is a core value at NCOC.*

**Policies, plans and programs.**
It is a guiding principle that every worker must return home to family and friends uninjured, fit and healthy. To this end, NCOC has a number of policies, plans and programs (these were described in more detail in the 2015 Sustainability Report):

*See NCOC's General Business Policy on Health, Safety, Security & Environment* [d]

- **"Lead2Safety".** A framework for our activities to maintain and improve health and safety culture and behaviors in NCOC and among our contractors.
- **Golden Rules.** Twelve Health and Safety "Golden Rules" apply to anyone working for NCOC, either employee or contractor. Along with the obligation to follow the Golden Rules, every employee also has the right to stop any activity they deem to be unsafe. Underpinning this authority is the belief that no task is so important, or so urgent, that is has to be carried out in an unsafe manner. This is supported by the "GRuVIS Golden Rule Visible Implementation System", where compliance with the Golden Rules is checked through inspections.
- **Lessons Learned – Root Cause analysis**. All work-related incidents are thoroughly investigated and the root causes identified and shared throughout the project and with NCOC shareholders to prevent re-occurrence of similar incidents. Sharing lessons learned is an important element toward improving safety at the different sites.
- **"SAFE-R," Shaping an Accident Free Environment – Reporting.** Any worker can report "interventions" – actions that were taken following positive or negative observations about safety – using a card reporting system.
- **Certification and Verification.** NCOC is certified to OHSAS 18001 (Occupational Health & Safety Management Systems). The external verification requires NCOC to regularly demonstrate not only compliance, but also continuous improvement in its management systems. Certification was renewed effective 11 January, 2016.

### SUMMARY OF GOLDEN RULES



### Workforce Health

A Health Risk Assessment (HRA) is completed by Industrial Hygienists to identify the significant workplace health hazards (physical, chemical biological, psychosocial, etc.), and to establish measures to mitigate or control these hazards, such as personal protective equipment like masks and gloves. Almost 14,000 NCOC staff and contractors who work directly at production facilities took "Go Sour" training in 2016 to provide a thorough grounding in the occupational hazards and safety measures associated with work around sour gas. NCOC has a seamless Medical Emergency Response strategy to cover the management of medical emergencies not only in the field, but also in collaboration with the local Oblast Hospital to sustainably raise medical standards for the whole community. NCOC works with medical insurers to provide a robust Fitness to work/medical surveillance system for staff which also includes reporting of occupational illnesses. Smoking is discouraged, and alcohol and drug abuse is prohibited in the workplace. We encourage personnel to get involved in sports activities.

### 2016 results.

Although the Lost Time Injury Rate (LTIR) was slightly improved over 2015, Total Recordables (TRIR) was higher, mostly due incidents resulting from icy conditions forming at sites in the fourth quarter. Various measures were made to to reduce slips, trips and falls, including increased attention to hazards, personnel awareness, and modifications to facilities.

### Incident Learnings in 2016.

Two "near-miss" incidents in 2016 did not result in injuries to personnel, but were nonetheless thoroughly investigated following established company procedures. Root causes were identified, corrective actions to prevent re-occurrence developed, and lessons learned shared across the company.

The first involved a side boom arm coming into contact with an overhead electric power line during pipeline replacement activities. Lessons learned focused on improving risk assessment and appropriate communication at the site, including signage around power lines. The second incident involved the roll-over of a contracted vacuum truck. Root-cause analysis showed several contributing elements, and lessons learned focused on fatigue management, driver competence, and work with subcontractors. This resulted in improvement actions that were implemented across the organization to prevent re-occurrence.



## 5.2 Process Safety and Asset Integrity

Process safety events are defined in industry standard **API RP 754**. These include loss of primary containment for any material, including non-toxic and non-flammable (e.g., steam, compressed air) if the event results in certain safety consequences or impacts to employees, contractors or residents. Tier 1 includes greater consequence events, and Tier 2 lesser consequence events.

In 2016, NCOC reported 0 Tier 1 and 1 Tier 2 process safety events. **This represents a remarkable success for NCOC's intense Operational Risk and Assurance effort in 2016 to safely restart Kashagan production (see inset)**. The lone Tier 2 event relates to human/procedural error (valve closing) rather than a facility fault, resulting in a low-consequence material spill within the facility but one that prompted improvement in documentation of tasks, shift handover, and periodic inspections to prevent re-occurrence.

## OPERATIONAL RISK AND ASSURANCE

Production could not restart in 2016 until the Operational Risk and Assurance (ORA) process had thoroughly checked that all necessary technical measures were completed and all required risk controls were in place in each facility, and throughout the entire facility, to assure process safety and asset integrity. The OPA process was augmented by a number of external reviews by NCOC shareholder companies, and by leak and pressure testing carried out prior to restart.

For a facility the size and complexity of the Kashagan Phase 1 project, this was a huge undertaking. The hazards at the facility first must be clearly identified, and mitigating measures identified to lower associated risks to as low as reasonably practicable. The "barriers" used to prevent incidents – technical/hardware or people/procedural – must be identified and supported by appropriate leadership and assurance measures. And a pre-startup safety checklist rigorously pursued until every element in the process chain has demonstrated its "fitness".

Also during 2016 a detailed dashboard of Process Safety performance indicators was developed that allows us to proactively track the effectiveness of the risk controls.

## 5.3 Fresh Water

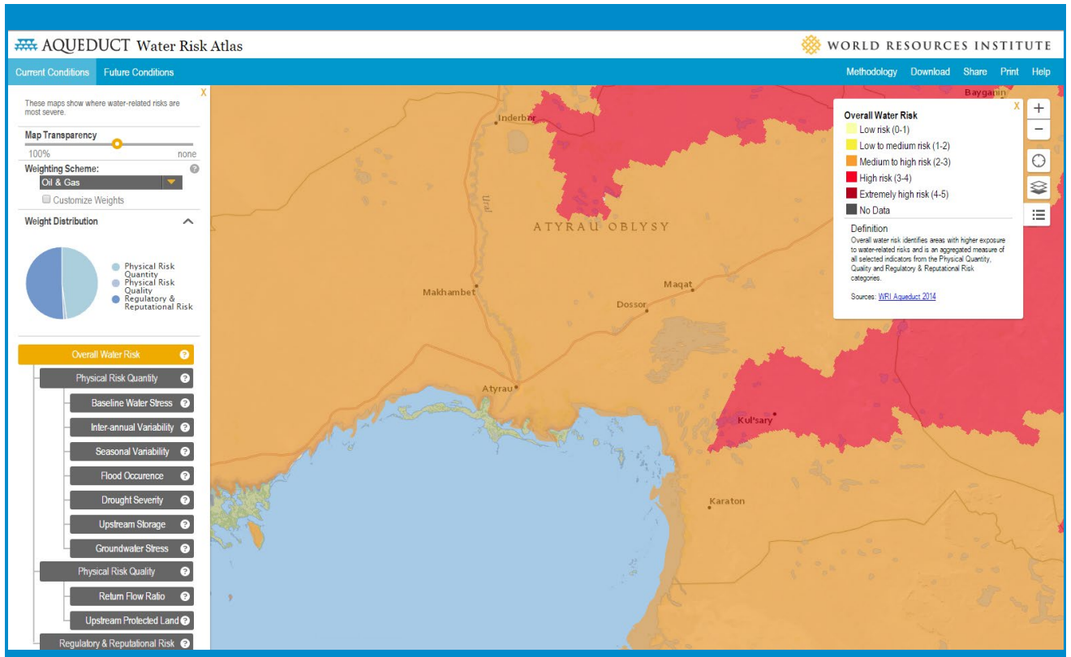
*NCOC is committed to maximize conservation of fresh water.*

**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 2016 was 1126 thousand cubic meters. The total volume of fresh water withdrawn in 2016 was 1014 thousand cubic meters. This represents a significant increase over last year due to the restart of production in the fourth quarter of 2016. 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 onshore processing plant for producing steam for processes and in the camps for household use. Offshore facilities also need fresh water: 112 thousand cubic meters was produced from desalination units offshore. This replaced fresh water that would otherwise be sourced from onshore.

**Policies, plans and programs.**
The water we use is discharged to lined evaporation ponds (see pg. 22) and does not come in contact with groundwater or soil. It evaporates and is not returned to the local watershed. Thus, multiple re-use of the water volumes we do withdraw is an important contributor to the sustainability of our operations. In 2016 NCOC treated and recycled more than 80 thousand cubic meters of water from household use onshore for greenbelt irrigation and for dust suppression purposes. We also recycle water for domestic use offshore. Up to 17% of the water used in onshore processing may be recycled, and in 2016 we completed some plant modifications to better segregate various process water streams that may in future allow us to recycle additional volumes of our process water.

NCOC plans in 2017 to report its water intensity (fresh water consumption normalized per unit of production) as a guide to its performance in conserving fresh water.



*Screenshot of the WRI Aqueduct Water Risk Atlas*



## 5.4 Greenhouse Gas Emissions

*NCOC is committed to reduce its 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 Greenhouse Gas (GHG) emissions from NCOC operations in 2016 totaled 1395 thousand metric tons $CO_2$-equivalent, including 1384 thousand tonnes of carbon dioxide ($CO_2$), 6.2 thousand $CO_2$-equivalent tonnes of methane ($CH_4$), and 4.7 thousand $CO_2$-equivalent tonnes of nitrous oxide ($N_2O$). This total includes mobile and stationary sources.

This is a significant increase over 2015, due to restart of production in the fourth quarter of 2016.

NCOC production facilities are self-sufficient in electricity, heat and steam. Indirect emissions arise from purchased power for support facilities such as Bautino base and Atyrau Training Center. Total indirect GHG emissions from NCOC operations in 2016 totaled 10.3 thousand metric tons $CO_2$-equivalent, all carbon dioxide.

NCOC plans in 2017 to report its GHG intensity (GHG emissions normalized per unit of production) as a guide to its performance in reducing GHGs.

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.

# 6. ENVIRONMENTAL STEWARDSHIP

## 6.1 Policies and Programs

**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.

*NCOC has a policy of zero discharge into the Caspian Sea; see Waste.*
*NCOC has a "No Routine Flaring" policy; see Flaring.*

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; monitoring performance and the effectiveness of mitigation measures, and continually re-checking the risks and improving the measures to address them.

## CASPIAN DAY 2016

NCOC regularly marks Caspian Day (12 August) as a way to honor this unique inland sea and those who study and protect its flora and fauna.

On August 10, NCOC environmental engineer Sergey Ukhov briefed local environmental NGOs in Atyrau on NCOC's programs for sampling the physical and chemical properties of sea water and bottom sediments, hydro-geological surveys, and other long-term environmental baseline monitoring programs that NCOC has carried out annually since the start of the project. (This follows a tradition from Caspian Day in 2015, when NCOC presented a new book entitled *"Environmental Monitoring of the North-East Caspian Sea during Development of Oil Fields"* [e] summarizing results of environmental monitoring.

And on August 7-13, NCOC jointly with Eco Mangistau (NGO) organized the Third Environmental Summer School in Aktau. Thirty-four students from Mangystau and Atyrau Oblasts – potential future ecologists (pictured) – took master classes and hands-on lessons from Russian and Kazakhstani specialists on topics such as diving, sample collection, Caspian seal population surveys, and much more. (see photo)

*See NCOC's General Business Policy on Health, Safety, Security & Environment* [d]

### Environmental Impact Assessments.

NCOC updated the Environmental Impact Assessment (EIA) covering its Phase 1 project in 2016, in accordance with official requirements, and obtained a positive conclusion from the government's environmental review panel. The studies developed for the North Caspian project engaged Kazakhstan environmental expert consultants, and have been presented to the local communities for public comment.

### Baseline Studies and Monitoring.

An essential technique of environmental protection is to understand initial conditions prior to project activity (the "baseline"), and then to monitor these conditions on an on-going basis as the project progresses to completion. NCOC has conducted hundreds such studies in all areas of our activity, with involvement of external experts and institutions. Specific studies are mentioned in appropriate sections below.

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.

*Link to Kazgidromet 2016 Report* [f]

### Environmental Sensitivity Mapping.

These interactive GIS (Geographic Information System) maps of landscapes, ecosystems, protected areas and habitats collate the data from many years of continuous environmental monitoring, and help define the most environmentally important areas around our operations for planning of oil spill response planning, biodiversity preservation, future development, and more. The maps are regularly updated.



### Environmental Protection Plans.

NCOC's environmental protection activities are guided by an Environmental Protection Plan that is approved annually by state environmental regulatory agencies. The type of projects included in the annual EPP include: 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.

## 6.2 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 programs.

In 2016 extensive data was collected during four marine environmental surveys (one at each season of the year) and two onshore surveys. 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 programs are described in more detail below for key indicator species.

### Caspian Seal.

The population of the Caspian Seal has been declining over the previous century, due to various natural and anthropogenic/technical (i.e. man-made) reasons. These include diseases, reproductive difficulties, changes in the food chain, and changes in ice formations as well as hunting, fouling in nets, and ship strikes. In 2008 the IUCN changed the status of the Caspian Seal from 'vulnerable' to 'endangered' and placed it on the Red List of Threatened Species.

## WHAT HAVE SEAL SURVEYS TOLD US?

The surveys have shown that the birth rate and location of breeding sites vary greatly from year to year, mostly due to changes in ice conditions and sea level, with no obvious trend over the study period.

See ***NCOC Biodiversity brochure*** and ***CISS studies*** for more detailed data on seal population, distribution of pups, recorded seal encounters, etc.

Observer reports indicate that icebreakers rarely if ever strike seals. To put this in perspective, ***CISS studies*** estimate that fishing by-catch and poaching result in the death of 1000s to 10,000s of seals each year, while licensed hunters harvest an additional 10s to 1000s of seals.

Some conclusions are restricted by lack of survey access to Russian sector of the Caspian. However, whilst this may limit the scope of scientific surveys, it does not hamper our ability to monitor seals in Kazakhstan waters and mitigate impacts from our shipping. In case of need, NCOC has potential access to satellite data, and is in touch with Russian researchers to compare and contrast results.

*The North Caspian project has taken the initiative to launch and fund early scientific studies that have made lasting contributions to our knowledge of the Caspian seal, and to designing strategies for its protection.*

The 2016 seal survey began on January 23 with two days of instruction at Bautino Base for vessels' captains and crews on mitigation measures based on scientific recommendations and global best practice in protection of marine mammals. For the next five to six weeks, seal observers accompanied the five icebreakers coursing between Bautino Base and the Kashagan field, mapping the haul-out sites along the navigation routes, counting and classifying seals, and observing their behavior during the breeding season. Observer teams, accompanied by inspectors from the Atyrau Oblast Department of Ecology and the Oblast Territorial Inspectorate of Wildlife and Hunting, surveyed survey seal concentrations by helicopter near the icebreaker corridors.

NCOC has fielded independent international and national seal experts to monitor and study seals every year since 2005, resulting in safer routes for the icebreakers, contributing to preserving the seal population in the North Caspian, and learning more about them as a species. These experts are now mostly experienced Kazakhstanis, with oversight by scientific institutes in Kazakhstan and Russia.

NCOC's Kazakhstani ecologists and wildlife specialists attended a conference in Astrakhan, Russia in November 2016 devoted to research and conservation of the Caspian seal, and another in Krasnodar, Russia in June devoted to sturgeon conservation.

### Fish.

All species of Caspian Sea sturgeon are now classified as 'endangered' by the IUCN. The native population has been impacted by overfishing and illegal fishing, as well as damming of rivers, agricultural run-off and industrial activities.

In addition to studies and voluntary financial contributions in previous years for a variety of upgrade projects, NCOC is making a sizable contribution to fish hatcheries on the Ural River as part of its compensation obligations to add over 700 thousand sturgeon fingerlings to the population in coming years. On July 20, the State Ural-Atyrau Sturgeon Hatchery in Kurilkino village released about 235 thousand fingerlings into the Ural river, the first annual release quantity as part of NCOC's contribution.



### Saiga Tagging.

Jointly with the Association for the Conservation of Biodiversity of Kazakhstan (ACBK), NCOC is continuing a program, launched in 2014, to tag and monitor a small population of saiga (*saiga tatarica*, dwarf antelope). Three animals were caught and affixed with telemetric collars this year during the October 2-13 expedition in Atyrau and Mangystau Oblasts, which allows specialists to follow their daily activities in real time using GPS tracking. Saiga were included in the IUCN Red List of Threatened Species in 1996 and declared critically endangered in 2002. Enthusiasts like ACBK have in recent years rallied to help the animal, supporting initiatives such as the 2000-hectare protected area in Issatay District that shelters a herd of about 100 animals.

### Record Number of Migrating Birds in Fall 2016.

NCOC started its annual fall-migration bird survey on September 12 with two days of monitoring on the artificial islands EPC 2 and EPC 4, followed by a helicopter survey of the Caspian coastal area run during four days between September 15 and October 24. The surveyors group included NCOC and contractor ecologists and ornithologists, and inspectors from the Atyrau Oblast Department of Ecology and the Oblast Territorial Inspectorate of Wildlife and Hunting.

The group counted over a million birds – a record high over the past ten years of surveys – including some of the most beautiful species such as Flamingo (55,000), Mute Swan (133,000), Great White and Dalmatian Pelican (6,000) and Red-crested Pochard (150,000).

Some of the largest flyways in the Eastern hemisphere pass through the North Caspian region. Coastal shallow water habitats and wetlands in the Ural River delta island systems are breeding and moulting grounds and long-term stopovers for the migrating birds. The Ak Zhaiyk State Nature Reserve in this area was designated a Wetland of International Importance under the UN Ramsar Convention in April 2009 and, as a result of a public-private initiative with NCOC shareholder Eni, a UNESCO Man & Biosphere Reserve in 2012.

The fall migration survey is one of four seasonal waterfowl and shore bird surveys that NCOC conducts every year: over-wintering, summer nesting, and fall-spring migrations.

## 6.3 Discharges to Water

NCOC discharges all treated wastewater from industrial processes and domestic sewage through filtration screens into lined evaporation ponds, with **no discharge into surface waters, including the Caspian Sea**.

The total quantity of hydrocarbons discharged with treated sewage and process water into evaporation ponds in 2016 was 0.23 tonnes.

NCOC uses lined evaporation ponds as the safest available method for managing treated process water, and is continuing to assess the possibility of subsurface injection, if suitable geological formations can be found. Wastewater from industrial processes at the Bolashak plant arises mainly from:

- $H_2S$ conversion into elementary sulfur. This water may contain sulfur and other residual components. It is treated in a sour gas stripping column to remove (by up to 400 times) most of the volatile components (e.g. $H_2S$, mercaptans).
- Produced water, i.e., water that has been separated from produced oil. This water may contain residual hydrocarbons. It is treated with demulsifiers, hydrocyclone separation, flotation and skimmers that reduce oil content by ~40 times.

In 2016, NCOC obtained all permits for discharge of treated process water to evaporation ponds in accordance with RoK environmental requirements.

## 6.4 Non-GHG Air Emissions

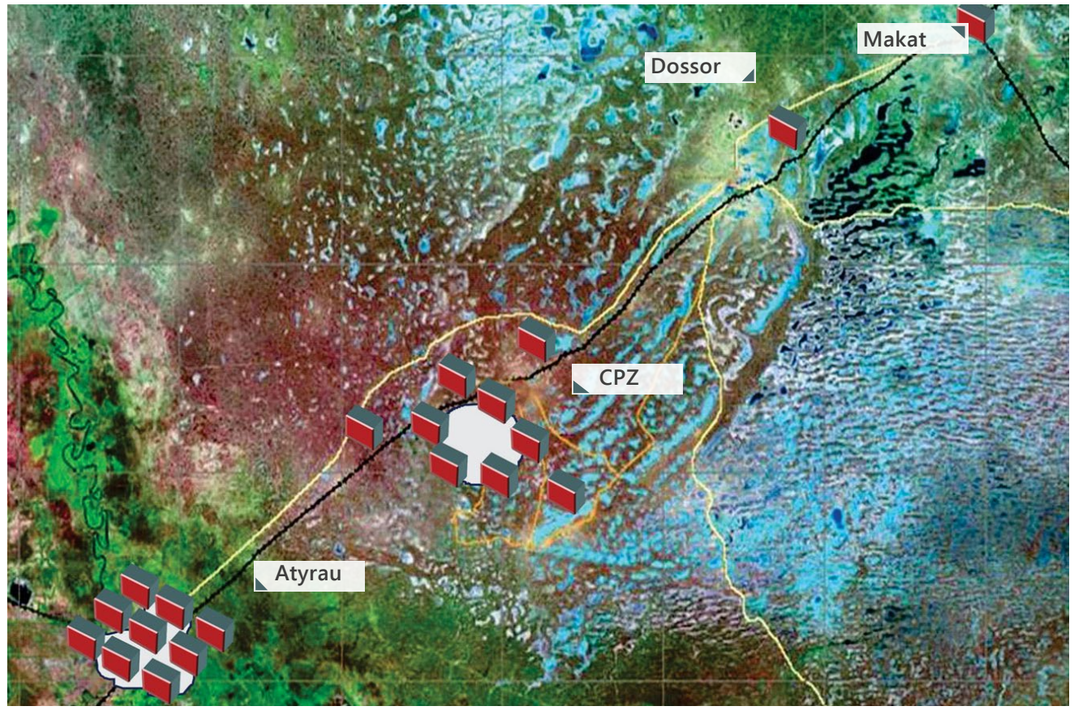
In 2016, NCOC air emissions from all operations were 56% of permitted volumes, and totaled:

637 metric tons of volatile organic compounds (VOCs)

56,408 metric tons of oxides of sulfur ($SO_x$),

1430 metric tons of oxides of nitrogen ($NO_x$ excluding $N_2O$), and

Compared to 2015, emissions were up in 2016 due increased gas flaring and power production after the restart of production in the fourth quarter.




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

Four stations are located on the perimeter of the setback area ("sanitary protection zone") for the Bolashak plant; 7 more are located in surrounding areas, including Dossor and Makat; and 9 are in Atyrau city proper.

The government meteorological agency (Kazgidromet) monitors this air quality data and publishes monthly and annual summaries (including NCOC's data for CO, $SO_2$, $H_2S$, NO and $NO_2$) on its website. The 2016 summary report may be found here

*Kazgidromet 2016 Report (in Russian)* [f]

## A FLARE IS A SAFETY DEVICE.

Flaring is a normal part of start-up and commissioning activities. As a plant reaches steady-state production, flaring occurs less often.

***If you see a flare, it means safety systems are operating as designed, to handle temporary changes in flow patterns.***

Volumes of gas flared are calculated and reported to RoK.

$SO_x$ and $NO_x$ (reported in 6.4, above) are possible combustion products from the flaring of sour gas. If $H_2S$ were to arise, it is almost always from a leak.

# *Case Study – Bolashak Emissions Safety*

With the restart of production in the fourth quarter of 2016, local residents and media have inquired about the air quality and safety aspects of emissions from the Bolashak plant, in particular gas flaring.

The primary guarantor of the plant's safety is the 7 km buffer (Sanitary Protection Zone or 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.

### Studies and Permits

The Environmental Impact Assessment for the project was updated in 2016. It received a favorable conclusion from the government's environmental expertise review, and shows that air emissions should remain within permitted concentrations at and beyond the perimeter of the 7-km Sanitary Protection Zone around the Bolashak plant, regardless of wind and weather assumptions.

*Link to 2013 Kazakh National Medical University study on Bolashak plant air emissions* [9]

Similarly, a 2013 screening study by the Kazakh National Medical University concluded that emissions from Bolashak plant do not pose a health risk to nearby residents, nor those in Atyrau city, as the risk of long-term negative effects is significantly lower than established minimums.

Furthermore, NCOC studied a scenario that is impossible in reality, but used as a theoretical "worst case": an $H_2S$ leak from full-bore rupture of a sour gas pipeline. The computer model shows that people just outside the 7-km radius may detect a smell for a time but will experience no long-term health effects at such low levels. The smell will dissipate relatively quickly.

NCOC also studied $SO_2$ emissions from intense sour gas flaring at maximum rate. We found $SO_2$ does not exceed allowed design levels beyond the 7-km perimeter.

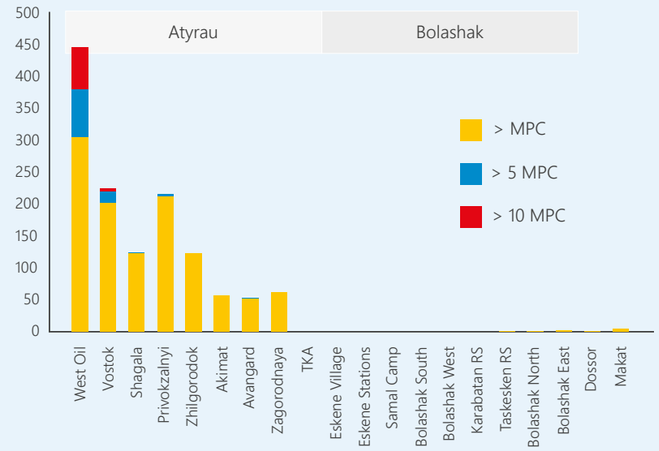
### Air Quality Monitoring Stations


### Operating Experience

Flaring occurred at Bolashak to deal with flow problems during start-up on September 11 – October 20, 2013. Even under these extraordinary circumstances, air monitoring at 7-km SPZ boundaries and nearby villages (see Section 6.4) shows average $H_2S$ and $SO_2$ emissions remained far below allowed levels. The data has been published by KazGidroMet.

During the 2016 re-start and associated sour gas flaring, the average $H_2S$ and $SO_2$ levels likewise remained far below allowed levels. In fact, ongoing monitoring shows consistently that higher-level short-term $H_2S$ peaks remain far more likely in Atyrau from other routine sources not associated with NCOC flaring than those measured near Bolashak.

### $H_2S$ Peaks in October-December 2016




## HYDROGEN SULFIDE

Hydrogen sulfide – $H_2S$ – is the air emission compound that concerns many. It is flammable, and highly toxic. 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.

$H_2S$ has a characteristic odor (some say like "rotten eggs") that can be smelled at concentrations thousands of times less than levels at which physical effects begin to take place (watery eyes and nose). Even these effects go away after a few breaths of fresh air; $H_2S$ does not accumulate and is rapidly passed out of the body. At ten times higher concentration, however, the sense of smell may be deadened and eye damage can occur; ten times more than that are very dangerous levels. For safety reasons, NCOC specialists who work in immediate proximity to wellheads, flash gas compressors and other equipment receive special training and personal detectors; they put on masks and breathing apparatus where such high concentrations are possible as an occupational hazard.

The risk drops off quickly the further from these locations; so do the potential concentrations. "Maximum Permissible Concentration" set by the Kazakhstan government is a conservative standard, similar to the World Health Organization's guidelines for short-term $H_2S$ ambient air exposure for the public at which about half the population may detect the smell (i.e., about 6 parts per billion). 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.

## 6.5 Oil Spills to the Environment

### Performance

In 2016, 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.*

### Prevention

By far the best defense against oil spills is to prevent them from occurring in the first place.

*Link to 2010 Oil Spill Response brochure (English).* [h]

Oil spills are prevented by identifying spill risks at all project phases, from design, to construction and operation, and ensuring that the highest safety standards are continuously applied to mitigate those risks. Approaches include:

- Addressing the human factor. Clear procedures and work practices are established, and monitoring and maintenance rules enforced through frequent training.
- Include early-warning and protective containment measures at the design stage, such as the impermeable geotextile membranes and runoff collection systems used on artificial islands offshore to prevent any hydrocarbons from reaching the Caspian Sea and seabed.
- Continuous reassessment of spill risks at all locations by trained specialists, and mitigation measures if risks are found. For example, OSR specialists are engaged when NCOC monitors its offshore wellheads on a yearly basis using divers.

### Technology

We employ a wide range of innovative technologies, such as remote aerial observation with the use of GPS-GIS handheld units and other remote sensing methods to monitor, map and detect oil spills as well as define oil film thickness in both open water and ice conditions. Computer-generated models of oil spill trajectories help responders understand where an oil spill might spread, depending on weather and sea conditions, and are a fundamental part of oil spill response planning.

In combination with environmental sensitivity mapping (see pg. 18), this helps set priorities in response planning in order to preserve important habitat and minimize impact on the environment. In September 2016, NCOC conducted a ten-day survey of reed beds and special training on their protection in the event of an oil spill.

NCOC is conducting research on spill response techniques and tools with potential application to the North Caspian.

- NCOC has conducted joint research with the Kazakhstan Institute of Oil and Gas on use of dispersants.
- NCOC is currently conducting research on the operational capabilities and related conditions for use of in-situ burning.
- NCOC is participating in joint work to support RoK Authorities in formalizing the related procedures and regulatory framework needed to use these oil spill response methods in case of incident.

## OIL SPILL PREPAREDNESS REGIONAL INITIATIVE (OSPRI)

OSPRI, the "Oil Spill Preparedness Regional Initiative (Caspian Sea – Black Sea – Central Eurasia)", was established in 2003 by a group of oil companies to promote sustainable oil spill response capability in this region. These companies are BP, Chevron, ENI, ExxonMobil, INPEX, Shell and Total – the latter five are major investors in the North Caspian project. NCOC's Crisis and Emergency Response Manager, Gani Zharikessov (pictured), is a deputy chair of OSPRI.

OSPRI provides the means of alignment and focus for the involved companies to share their knowledge and resources, giving consistent support to governments in developing oil spill preparedness in the region. OSPRI is not an oil spill response organization or company with resources on standby, and has no vested interests in particular services or approaches.

The business plan is grouped into five core themes of support and advocacy:

- National planning
- Regional planning
- Equipment and infrastructure
- Cooperative agreements
- Training and exercising

IPIECA (***www.ipieca.org***) is the umbrella organization under which OSPRI functions. IPIECA has a joint programme with the ***International Maritime Organization (IMO)*** – a specialized UN agency – called the ***Global Initiative (GI)***, which promotes improved oil spill contingency planning around the world. OSPRI is fully integrated and coordinated with the GI and represents the main mechanism to achieve the GI's objectives in this region.

OSPRI also works with a wide range of other international organizations, including International Financial Institutions, donor agencies, UN agencies (e.g. UNEP and UNDP), the ***IOPC Fund***, ***International Tanker Owners Pollution Federation (ITOPF)***, Oil Spill Response Limited and other commercial oil spill service providers, the European Union, and the ***Organization for Security and Cooperation in Europe (OSCE)***.

OSPRI's regional focus assists its members to integrate and address risks associated with their production and transportation. This recognizes that an incident which may be geographically distance from a business unit's production or oil handling operations may cause widespread and serious disruption, for example if export routes are disrupted.

OSPRI's 2016 report is available ***here***. [i]

### Response

NCOC maintains a comprehensive Oil Spill Response Plan that is regularly drilled, including joint exercises with responsible government agencies. The Oil Spill Response plan has detailed sections for incidents along the pipeline, with environmental sensitivities identified and specific response guidelines established for each pipeline.

NCOC has a dedicated Oil Spill Response group, staffed by about a hundred fully-trained, full-time responders, maintenance personnel, and vessel crew for a dozen shallow draft vessels and several oil recovery barges. Tens of kilometers of oil boom, absorbent material, floating and collapsible tanks, containers, and other equipment have been specially procured for operating in the unique environment of the North Caspian Sea, and are warehoused at marine support bases in Bautino and Damba (the latter operated for NCOC under contract to KMG Systems and Services).

In 2016, NCOC conducted more than a hundred major and minor exercises at all locations, involving training for nearly nine hundred NCOC staff and contractors.



## 6.6 Waste

Total quantity of waste classified as hazardous by the RoK and disposed from NCOC operations in 2016 was 12,090 tonnes. This number includes some wastes classified as green under Basel Convention rules, such as office equipment, wood and food waste, spent air filters, etc.

Total quantity of waste classified as non-hazardous by the RoK and disposed from NCOC operations in 2016 was 11,115 tonnes.

In line with our **"Zero Discharge" policy in the Caspian**, all waste materials from offshore facilities are brought to shore for treatment and recycling or disposal, including cuttings (mixed soil, rock and lubricant fluids brought to the surface as a by-product of drilling). The solid waste is disposed by a specialized and licensed company, selected by competitive tender, with demonstrated capability to process and dispose of the project's solid waste in line with our sustainability requirements.

## 6.7 Onshore and Offshore Surveys

NCOC implements comprehensive environmental monitoring programs 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, fish). Starting in 2013, we added air quality, birds, and additional Caspian seal studies.

NCOC conducts onshore monitoring surveys to analyze soil and groundwater quality in Atyrau and Mangystau regions. In 2016 the project conducted ten such surveys with thousands of laboratory-analyzed samples. The Caspian onshore area has a long history of oil production, so the scope of onshore surveys takes into account historic activities and data as well as current activities of nearby oil and gas developments. The soil surveys since 2005 show a general improvement in terms of heavy metals and organics. Groundwater surveys from 2005 to 2010 show it to be unfit for industrial or other use, mostly due to high salinity.

## 6.8 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 program needing an environmental impact assessment to determine the preferred option to apply to a particular facility.

## *Case Study – Sulfur Management*

Processing sour gas and managing sulfur safely and effectively is of crucial importance to the Project.

The project design calls for up to 80% of the sulfur to be returned to the reservoir via the sour gas re-injection systems. The remaining 20% will remain as elemental sulfur, generated as a by-product at the Bolashak onshore process facility.

An average of around 1.1 million tonnes per year of elemental sulfur will be produced during the life of the project (3,800 tonnes of sulfur per day).

Sulfur is a commodity with market value and growing demand, and the project's shareholders intend to sell all that is produced. International market opportunities are in China and the western Mediterranean as a raw material for agricultural fertilizers. NCOC has also worked with Kazakhstan and foreign institutes to study prospective applications for sulfur in construction and road-building, and as a fertilizer component for the highly saline soils found in Kazakhstan.

Sulfur will be exported to these markets by rail through a dedicated loading facility at Eskene West. Up to 4 million tonnes of sulfur may be stored on a temporary basis. At the end of 2016 about 125,000 tonnes of sulfur were in storage, pending completion, commissioning and start-up of the rail loading facility in 2017.

Pure elemental sulfur is odorless and non-toxic, and non-reactive with water or air. However, it does need to be handled properly to reduce generation of airborne dust.

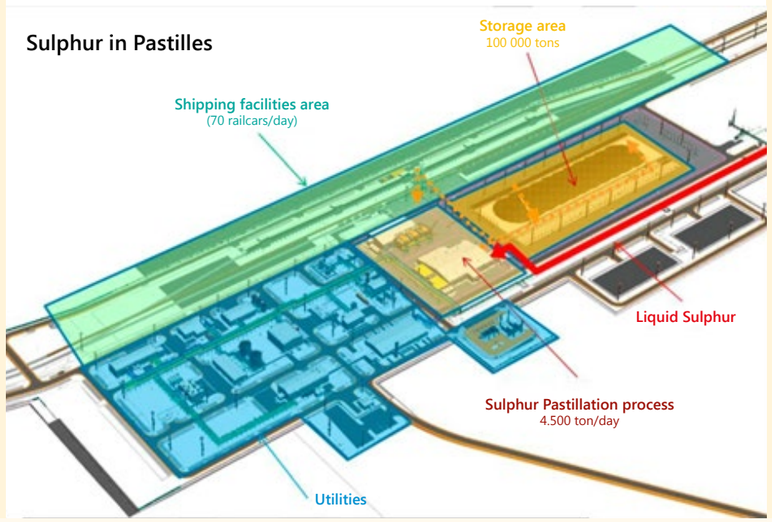
The sulfur byproduct produced by the Project is in liquid form. For its temporary storage, the sulfur is poured into large (100m x 300m) solid blocks at a rate of about 7 mm per day. Once a block reaches a certain height it is covered with a weighted polymer sheet. This prevents the sulfur from coming in contact with wind or water. When the time comes to transport, the blocks are re-melted and the liquid sulfur formed into tiny solid pellets (pastilles). Blocks are not crushed, which is one measure for preventing loose sulfur or sulfur dust.

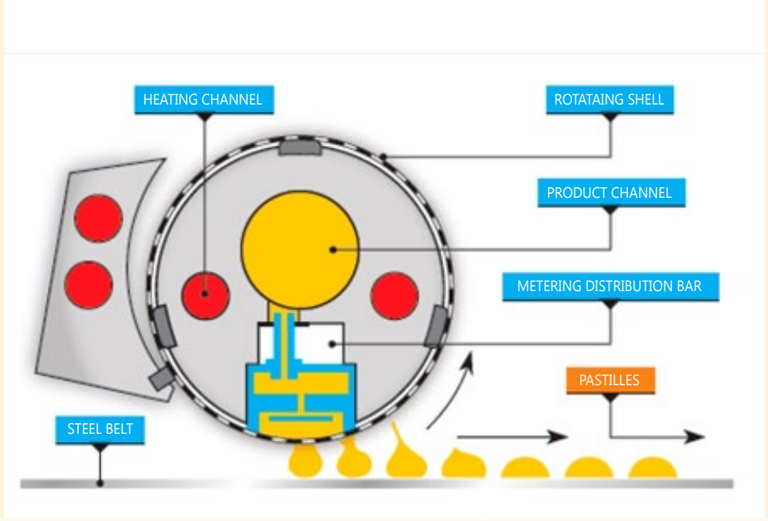
The storage area is lined and provided with drainage to prevent seepage into groundwater, and fully equipped with fire- and gas-detectors along its perimeter.

A special facility cleans the rail cars within 24 hours and, after filling with sulfur pastilles, covers them prior to transport

## FUTURE PHASES

NCOC is exploring economic development options for future Phases that, in combination with reinjection, would reduce by up to 90% the volumes of additional associated sour gas to be processed. This could almost completely eliminate production of additional sulfur as a by-product from these future Phases.





# 7. ECO-EFFICIENCY

## 7.1 Energy

NCOC production facilities are self-sufficient in electricity, heat and steam. Indirect emissions arise from purchased power for support facilities such as Bautino base and Atyrau Training Center. Energy use in NCOC operations in 2016 totaled 14.0 million gigajoules (GJ), of which 0.11 million GJ was imported (purchased).

NCOC plans in 2017 to report its energy use intensity (energy use normalized per unit of production) as a guide to its performance in energy conservation.

**In 2016 NCOC began a broad-ranging energy audit of its facilities**, and will report further on measures undertaken to increase energy efficiency in future Reports.

Though NCOC's energy needs for production facilities will be fully met using a small portion of the gas processed, we continue to look for niche applications (e.g., remote, off-grid locations or support facilities) in which alternative or renewable energy sources make sense both economically and technically.



## 7.2 Flaring

*NCOC has a "No Routine Flaring" policy.*

The Kashagan Phase 1 project was designed from the beginning to avoid routine flaring, i.e., burning of excess natural gas when an oil and gas project has no other economic way to dispose of it "routinely," in the course of producing oil. All of the gas produced in Kashagan Phase 1 will be 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 2016 was 29% of permitted volumes, and totaled 129 million $Sm^3$ (standard cubic meters). Flaring increased in 2016 due to restart of production in the fourth quarter. The frequency of flaring will decrease after new production capacity has been brought on-line and stabilized, and we look for further opportunities to improve process stability.

# 8. 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 Kazakh people and opportunities for local companies. At the peak of construction in 2010, the Kashagan Phase 1 project employed more than 42,000 workers, including contractors, making it one of the largest employers in the country. NCOC remains a major employer in Atyrau and Mangystau Oblasts today.

*US$757 million was spent for local goods works, and services in 2016. Overall payments for local goods, works and services have totaled more than US$13.3 billion since 2004.*

Mangystau and Atyrau oblasts also benefit from social and infrastructure related projects funded by NCOC. These have totaled more than 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.

## HONORED FOR SOCIAL INFRASTRUCTURE

Several NCOC employees in 2016 received government awards in recognition of service to Kazakhstan. NCOC's Social Infrastructure Projects Manager Ruslan Aubekerov is deserving of special note. He was awarded the State Order of Kurmet at an official ceremony held in Akorda Presidential Palace in Astana on December 13, following nomination by Mangystau Oblast Akim Alik Aidarbayev "in appreciation of his significant contribution to the social and economic development of the region". The award is given by the RoK Government to those exhibiting merit in the fields of economics, science, culture, social issues and education.

# 9. SOCIO-ECONOMIC

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

*Link to 2012 "Good Neighbor" brochure (English).* [j]
*Link to 2014 NCOC Local Content brochure (English).* [k]

## 9.1 Social Infrastructure Projects

Under the North Caspian Sea PSA, NCOC allocates a budget each year for the development of social infrastructure projects. In 2016, 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.

**SIP PROJECTS DELIVERED IN 2016**

| | | |
|---|---|---|
| Oblast Infectious Disease Hospital | Atyrau City | $8.1 million |
| Roads (2 projects, 4.9 kilometers) | Mangystau Oblast | $4.7 million |
| Boarding School | Ft Shevchenko | $7.4 million |

*Handover of Atyrau Oblast Infectious Disease Hospital in December 2016*

Between 1998 and 2016, 168 social infrastructure projects have been completed. Cumulative spend on social infrastructure projects has thus reached US$525 million. Projects receiving investment in 2016 and expected to be completed in 2017 include the following commitments (including applicable taxes):

- Atyrau Oblast: 17 projects for $13.3 million
- Mangystau Oblast: 6 projects for $9.5 million

Social 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.

## 9.2 Sponsorship and Donations Program

Through its Sponsorship and Donations grant program, 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 sponsorships and donations. The Sponsorships and Donation grant program 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 2016, 71 projects were undertaken (35 in Atyrau Oblast, 36 in Mangistau oblast). A total of $16 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 2016, NCOC covered travel, camp, and cultural-educational development expenses to send these children to the Baldauren center in Burabai.

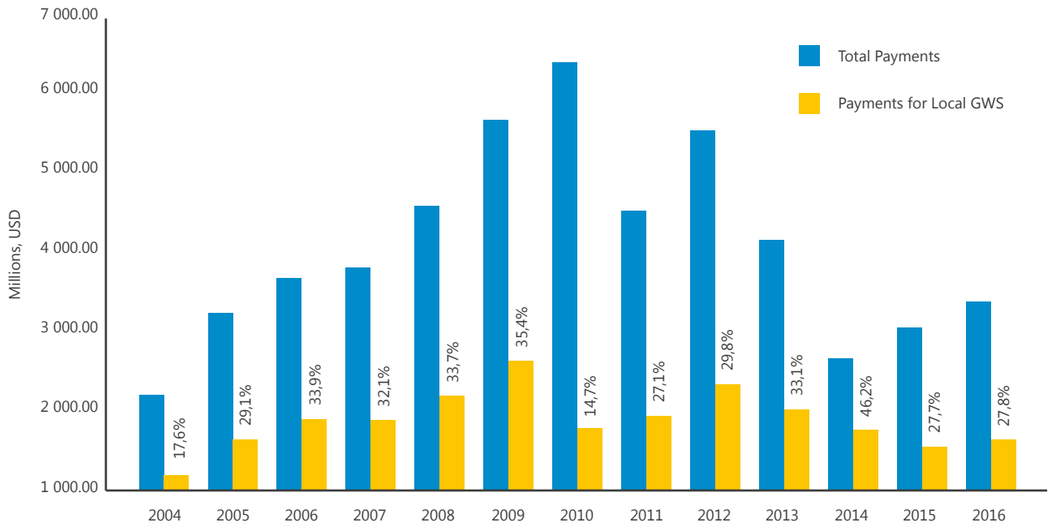
## MEKTEPKE ZHOL

NCOC supports the nationwide Mektepke zhol ("Road to School") initiative each August by donating backpacks, stationery and other supplies to deserving families in our community. In 2016 NCOC representatives handed out supplies to four hundred small scholars in Atyrau, Aktau, Tupkaragan, and Makat. The smiles were priceless.

## 9.3 Commitment to Local Content

*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.*

### Payments and Local Content Payments for 2004-2016




In 1993, an offshore oil and gas service industry was practically non-existent here. Almost none of the needed infrastructure, equipment, vessels and drilling rigs needed for a large-scale offshore project like Kashagan could be found locally.

Substantial investments over time into local suppliers, workforce, and infrastructure have resulted in the establishment and growth of entirely new industry in Kazakhstan. At the peak of construction in 2010, the Kashagan Phase 1 project employed more than 42,000 workers, including contractors, making it one of the largest employers in the country. In 2016 the North Caspian project spent US$757 million for local goods, works and services, equivalent to 28% of total expenditures, for a year-end total of more than US$13.3 billion spent on local goods, works and services since 2004[11]. These and other facts speak to the depth of NCOC's commitment to the use of local content.

[11] 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



## 9.4 Local Content: NCOC Policy and Programs

NCOC gives preference to local suppliers provided they meet quality, safety standards and offer materials and services competitive in price, quality and availability to those provided by international suppliers.

*Link to NCOC Local Content Policy* [l]

Local content strategies are implemented at the earliest possible stage to allow for capacity development of local companies. During engineering and design stages of the project, opportunities for local suppliers were maximized by including, whenever possible, standards and specifications used locally (e.g., GOST standards). 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.

Furthermore, NCOC has developed a systematic approach – a long-term Local Content Development Program – to help identify the business opportunities for local companies, and to develop their ability to meet NCOC's prequalification criteria in supplying them.

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

### 2016 PROGRESS UPDATE: AKTAU DECLARATION

On September 25 2012, NCOC, and three other oil and gas operators (KazMunayGas, TCO and KPO) signed the "Aktau Declaration" on joint actions for promoting development of a local oilfield service industry in Kazakhstan.

*Link to description of 2012 Aktau Declaration* [m]

One of the topics being worked is harmonization of NCOC's vendor database with a new web-based vendor database, called "ALASH", that was launched by the Ministry of Energy in 2016. Once fully harmonized with all Operators' databases and technical requirements, ALASH could become a "single point of contact" for local vendors to advertise services and raise their visibility with all major industry players at once. It also will provide a unique forum for exchanging industry news, informing about new standards and regulations, joint venture and financing opportunities, and other helpful services. In the meantime, NCOC continues to use its existing vendor database as the transition continues.

The signatory companies agreed to work together to analyze future purchase plans and identify products or commodities that might have market demand sufficient to support localized manufacture in Kazakhstan.

Top-10 potential commodities identified as a priorities for local capacity development for 2017-2018 are the following:

Goods:

1. Flanges and fittings;
2. Piping and pipe products;
3. Heat exchangers;
4. Consumables;
5. Electrical equipment;
6. Shutoff valves;
7. Drilling equipment and materials.

Services:

1. Maintenance;
2. Well equipment support and repair services;
3. Waste management.

## 9.5 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.

About three thousand Kazakhstan companies are registered in the NCOC Vendor Qualification Database.

*Link to 2014 NCOC Local Content brochure (English)* [k]
*Link to NCOC Contractor Success Stories (downloadable video)* [n]
*Link to NCOC Procurement Process* [o]
*Link to NCOC Supplier Qualification* [p]

More than a thousand local companies have participated in workshops and forums organized by NCOC, ranging 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 2016, 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 2016, NCOC conducted more than two 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 2016 the Operator provided more than two thousand employees of local companies with specialized professional training in the most in-demand craft skills. This 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. Some 25 courses were conducted in Atyrau, Almaty and Ust-Kamenogorsk this year, on topics such as Working in Confined Spaces, Industrial Welding Safety, Electronic Systems and Assembly, Working at Height, Mobile Crane Operations, etc.

As a result of purposeful activities by the Operator, nearly 70 joint ventures were formed and contracted to provide goods and services to the project in Kashagan Phase 1. Formation of joint ventures, joining Kazakhstan capacity and skills with Western experience and financing, is way to efficiently increase local content.


### INTERNATIONAL STANDARDS TRAINING

In 2016, thirty-five local companies successfully completed the training program organized by NCOC and received certificates of conformity to international standards in quality management and health, safety and environment (ISO 9001, OHSAS 18001 and ISO 50001). Award ceremonies were held on April 22 and December 6. This brings to more than 200 the number of companies certified under this program since 2006, thus increasing local capacity to meet international standards and to compete for NCOC contracts in goods, works and services.

## AREAS OF OPPORTUNITY

NCOC has defined several categories of medium- to high-value goods and services that are central to us in terms of business criticality, and could be areas for 'early tendering.' These include:

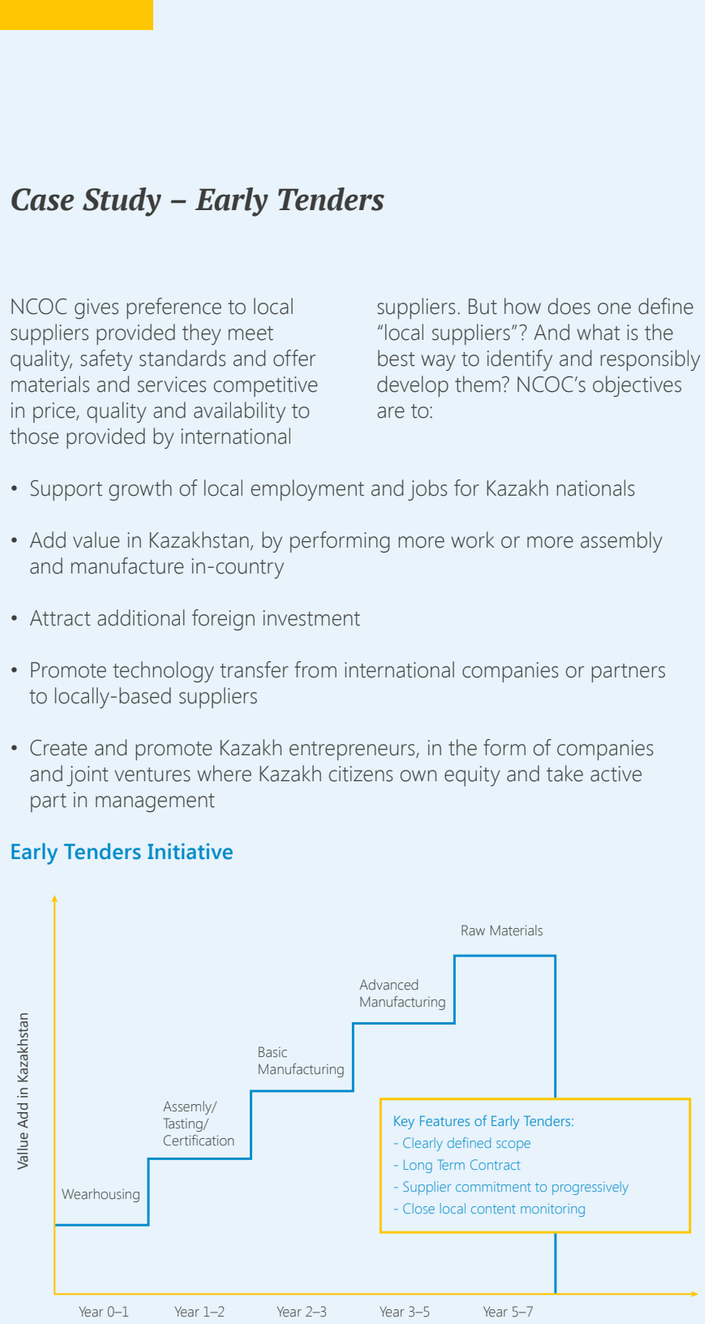
- personal protection equipment
- fabrication for plant changes
- paint
- flanges
- extruded and molded rubber products
- blast-proof electrical assemblies
- various electrical consumables
- lubricants
- liftings & slings, hand tools, nuts & bolts, hoses
- catalyst consumables
- small (<3" diameter) valves
- Services: valve maintenance, rotating equipment, etc.

## *Case Study – Early Tenders*

NCOC gives preference to local suppliers provided they meet quality, safety standards and offer materials and services competitive in price, quality and availability to those provided by international suppliers. But how does one define "local suppliers"? And what is the best way to identify and responsibly develop them? NCOC's objectives are to:

- Support growth of local employment and jobs for Kazakh nationals
- Add value in Kazakhstan, by performing more work or more assembly and manufacture in-country
- Attract additional foreign investment
- Promote technology transfer from international companies or partners to locally-based suppliers
- Create and promote Kazakh entrepreneurs, in the form of companies and joint ventures where Kazakh citizens own equity and take active part in management

### Early Tenders Initiative




To meet these objectives NCOC has been trying something new, called "early tenders". The mechanism is working well for us today, and will lead to even greater Kazakhstan content in future.

The idea is to find locally-based suppliers in key categories who will commit to invest and work closely with NCOC with clearly-defined scope and under long-term contract to gradually increase their Kazakhstan content in a "staircase" approach.

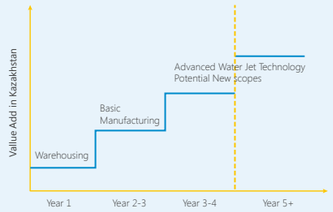
At each "step" of the staircase, the supplier's business plan moves from simply warehousing imported goods, to assembly, testing and certification in-country, then basic manufacturing, and finally advanced manufacturing and sourcing domestic raw materials. Each "step" is a step-up in value added within Kazakhstan. Each "step" also requires the supplier's commitment to progressively invest, based on a credible business plan, accompanied by close local content monitoring by NCOC.

We see practical advantage to NCOC in building local capacity – the lead time for sourcing materials will be shorter, and if there are problems we don't have to send overseas for help in fixing it.

Here are three examples of "early tendering" in action:

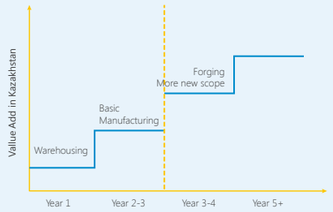
### Gaskets – Novus Sealing Caspian LLP

One of the first NCOC contracts awarded to a domestic manufacturer has been with Novus Sealing Caspian LLP, a joint venture between local partners and Flexitallic Group, a major global gasket producer. They manufacture in Kazakhstan more than 200 line items of different types and complexity. Novus Sealing Caspian is fairly advanced along the 'stairstep;' the next step is to move to advanced manufacturing techniques. With help of their partner, the company is introducing a new water-jet cutting technology to increase the range of gaskets produced locally and reduce lead time for manufacturing.



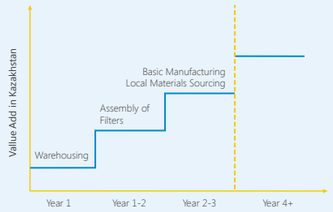

### Blind Flanges, Caps and Plugs – Continental Fittings & Flanges

This contract was awarded to a local joint venture (between Atyrau Neftemash and Farina Group of Companies) for a work scope including approximately two thousand line items of flanges, spacers, caps and plugs. It starts with importing forged blanks and doing some basic finish machining here in Atyrau, but the supplier has obligated to undertake internal investments and train Kazakh nationals on advanced computer-controlled machining to upgrade and begin producing forgings in Atyrau within the next 18 months.




### HVAC Filters– Altezza LLP

The scope of this contract includes about 150 line items of filters of different types for use in heating, ventilation and air-conditioning systems. Initially Altezza LLP simply imported and warehoused all filters needed. But within the first 18 months of the contract, the supplier began manufacturing the filters here, which brought "local content certification" (ST KZ) to over 70% - and opened other business opportunities for Altezza LLP in supplying the local market. All locally-produced filters have now been approved for use within NCOC following testing and evaluation.




## 9.6 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 program for identifying and recruiting Kazakhstan citizens, and providing them with training for advancement in a long-term career with NCOC (see inset). More than a thousand Kazakhstan citizens have been recruited or trained by the Operator since the program began in 2002.

The Atyrau Training Center, a purpose-built facility that is home to NCOC's training programs, has 14 classrooms, mechanical and demonstration workshops, a library, auditorium, Operator Training Simulator room, and exhibition center.

Since 1998 more than 15,000 Kazakhstan citizens have received training, either from NCOC or as employees of local companies being helped by NCOC.

Over two decades, the Operator has spent in total about US$250 million on job skills and professional training to build local capacity for the North Caspian project.

*The DrillSim-5000, a $1.25 million drilling training simulator donated by NCOC in December 2016 to the Kazakhstan-British Technical University Drilling Centre in Almaty. More than forty graduates of KBTU are NCOC employees today. NCOC has provided more than 300 million KZT in scholarship assistance to 313 KBTU students over the years, including fifteen in the 2016-2017 academic year.*



## 9.7 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 2016, the Kashagan Phase 1 project has already significantly exceeded these targets:

69% of managerial staff;

96% of technical and engineering employees, administrative staff, and qualified specialists;

100% of workers and supporting personnel.

Strong growth was noted in Kazakhstani managerial staff in 2016.

Overall, 86% of the three thousand employees of operating company NCOC are Kazakhstan citizens, and 90% of the more than 15,000 people working on the North Caspian project are Kazakhstan citizens at the end of 2016.

## 9.8 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.*

*Link to NCOC General Business Principles* [q]
*Link to NCOC Code of Conduct* [r]

### 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 contract staff. 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 programs 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.

### TYPES OF TRAINING PROGRAMS PROVIDED BY NCO:

- Language courses, from beginner to advanced.
- Continuing Education: sponsored pursuit of a degree or other professional improvement for employees, with a commitment to continue a career at NCOC for at least 3 years after completion of study.
- Internship: a summer unpaid-work opportunity for Kazakhstan undergraduates, performing substantive project-related work under guidance of an NCOC mentor, allowing them to learn more about NCOC - and NCOC to learn more about them as potential employees.
- Young Professionals Training: mentored development and career planning for new-hire college graduates at NCOC.
- Leadership Development: training core behaviors expected of future leaders in NCOC, including skills as mentors of others.

NCOC provides certain types of training as a PSA requirement:

- A competitive university scholarship program for non-employee nationals majoring in petroleum-related subjects, run by Kazenergy (2559 scholarships since 1998). For applications or more details, *see link.* [s]
- Courses to introduce RoK regulators to certain aspects of oil and gas operations that will help them perform their official duties, such as logistics planning, economic analysis, petroleum accounting, contract administration, etc.
- New technology transfer, e.g., provision and purchasing of technical literature, professional publications, scientific instruments, materials and other equipment requested by RoK. The Drill-Sim 5000 (see photo) is an example.

**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 and/or the NCOC Ethics & Compliance officer for further investigation and possible action.

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. 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.

## 9.9 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[12].

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.

## 9.10 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 minerals development industries in Kazakhstan. NCOC is also 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.



# 10. SOCIAL PROGRESS

## 10.1 Engagement with the Local Community

*NCOC is proud to call Atyrau its home. More than 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, Kazakhstan, 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.

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


### NGO RECOGNIZES NCOC CONTRIBUTION

In Aktau on December 8, 2016, NCOC was awarded one of 16 "Priznaniye" awards from the Eco-Mangystau NGO, in the Ecological Initiatives category, noting our "contribution to environmental protection and support of NGOs in realizing their sustainable development projects", as well as for NCOC's leading role in social partnership and collaboration in the Oblast

- On Saturday, April 16, nearly a hundred NCOC staff planted elm and ash saplings in Atyrau as part of a nation-wide greening initiative. Atyrau City Akim Nurlybek Ozhayev visited the NCOC location to thank the volunteers. Atyrau citizens planted 13,000 saplings in total that day.

- NCOC and local environmental NGOs organized a litter clean-up day on Saturday, May 14 along the popular walking paths on the banks of the Ural river in Atyrau. Nearly a hundred enthusiastic volunteers pitched in, including students and NCOC staff; NCOC also provided tools, water and personal protective equipment, and instructed on safe approaches to the job.

NCOC and its employees also take part in holidays and other events important in the life of the community, such as Nauryz (Kazakh New Year) and Victory Day. The company annually organizes community engagement events with the participation of children from low-income families and disabled children. We provide grants for community initiatives through our Sponsorship and Donations program; see above.



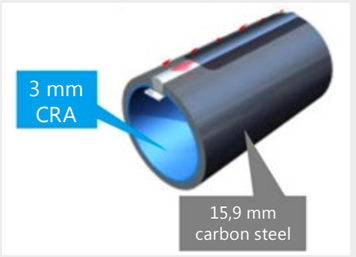
We engage on a regular basis throughout the year with the public to share information or discuss their concerns and questions about the North Caspian project, in meetings ranging from small gatherings to large public hearings. In 2016, these activities including the following:

- Representatives of local environmental NGOs toured onshore facilities and construction sites on April 19. After a safety induction and project briefing, the group toured the Bolashak Onshore Processing Facility with NCOC site managers, visited the Eskene West Fire Station, and had opportunity to inspect first-hand the 12-meter pipe joints of the replacement pipeline, internally clad with corrosion-resistant alloy and weighing 10 tonnes apiece (see photo).

- A public hearing on the Environmental Impact Assessment (EIA) of the Amendment to the Kashagan Experimental Program Development Scheme (KEPDS) took place in Atyrau on June 10. The event was attended by Atyrau Oblast Akimat officials, students and community members, NGOs, journalists, scientific experts and academics. Managing Director Bruno Jardin, in opening the meeting, noted that KEPDS contains "corrections to the overall project that modify its scope and certain technical parameters, but do not alter the fundamental design solutions approved in 2013".

- On December 14, NCOC held a roundtable in Atyrau with NGOs to obtain comments on its 2015 Sustainability Report. Also in attendance were representatives from the Atyrau Regional Departments of Ecology and Natural Resources Management, Regional Forestry and Fauna Inspection, Industrial Security Department of RoK Committee of Emergency Situations and Regional Sanitary Inspection.

The replacement pipelines are made of a two-layer composite steel, consisting of a cladding layer, in contact with the sour oil and gas, made of a corrosion-resistant alloy (CRA): and a backing layer, made of specially formulated carbon steel to provide the strength and toughness required to maintain mechanical integrity.



NCOC has a broad-ranging communications program to reach out to stakeholders on topics of interest. We actively work with local media outlets and regularly update the NCOC website (***here***). As restart approached in 2016 we intensified engagement with the local communities around Bolashak and met regularly with the village Akims to ensure regular contact in the event of complaints or questions. 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.

## 10.2 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 plans employee satisfaction surveys in 2017 to measure employee engagement and opinions about Company compensation and benefits, work environment, management, career growth and other topics.

### 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. NCOC aims to have formal representation of women in the Senior Leadership Team.

*In 2016, 33% of NCOC's workforce are women.*

### 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.



## 10.3 Human Rights

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. .

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 programs 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 programs 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

*Voluntary Principles on Security and Human Rights* [t]

## NCOC WOMEN'S NETWORK

Started in 2015, the Women's Network holds lecture and networking sessions with the aim of connecting motivated and talented professional women (and men!) to exchange information about careers, expand contacts with co-workers, and share advice on maintaining a healthy work and family balance.

The Women's Network launched a pilot Mentoring project in 2016, in which a dozen young women professionals have found senior colleagues willing to spend time to share professional knowledge on a one-to-one basis. The project was well received, and will continue in 2017.

# 11. REPORTING PROCESS

## 11.1 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.

## 11.2 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 this report on page 12.

## 11.3 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.

## 11.4 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 2015 were verified in compliance with RoK legislation by EnEco Solutions (Uralsk, Kazakhstan).

NCOC holds the following certifications:

- OHSAS 18001 (Occupational Health & Safety Management Systems)
- ISO 14001 (Environmental Management Systems)
- ISO 9001 (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.

## 11.5 Table of Correspondence to IPIECA Indicators

| REPORTING OVERVIEW | IPIECA INDICATOR | PAGE |
|---|---|---|
| The North Caspian Project | SE13 | 4 |
| Health and Safety | HS1, HS2, HS3 | 13 |
| Process Safety and Asset Integrity | HS5 | 15 |
| Fresh Water | E6 | 16 |
| Greenhouse Gas Emissions | E1 | 17 |
| Biodiversity and Ecosystem Services | E5 | 19 |
| Discharges to Water | E7 | 22 |
| Non-GHG Air Emissions | E8 | 22 |
| Oil Spills to the Environment | E9 | 26 |
| Waste | E10 | 29 |
| Decommissioning and Remediation | E11 | 29 |
| Energy | E2, E3 | 32 |
| Flaring | E4 | 33 |
| Social Infrastructure Projects | SE4 | 34 |
| Sponsorship and Donations Program | SE4 | 35 |
| Local Content: NCOC Policy and Programs | SE5 | 37 |
| Growing Local Industry Capability | SE7 | 38 |
| Job Skills Training and Knowledge Transfer | SE17 | 42 |
| Nationalization | SE6 | 43 |
| Business Ethics | SE9, SE11, SE12 | 43 |
| Preventing Corruption | SE11, SE12 | 44 |
| Engagement in Public Policy | SE14 | 44 |
| Engagement with the Local Community | SE1 | 45 |
| NCOC Workforce; Labor Rights | SE15, SE16, SE18 | 48 |
| Human Rights | SE8, SE9, SE10 | 49 |

# 12. ENDNOTES

**a – Page 4:** *http://www.ncoc.kz/en/kashagan/technical_challenges.aspx*

**b – Page 7:** *http://www.ncoc.kz/en/mediacentre/2016/news-24-12-2016.aspx*

**c – Page 9:** History in Milestones, on NCOC website,
*http://www.ncoc.kz/en/ncoc/ncspsa.aspx*

**d – Page 13:**
**Page 18:** NCOC General Policies in Health, Safety and Environment,
*http://www.ncoc.kz/en/oil-and-gas/hse.aspx*

**e – Page 18:** Environmental Monitoring of the North-East Caspian Sea,
*http://www.ncoc.kz/pdf/publications/Environmental_Monitoring_of_the_North-East_Caspian_Sea.pdf*

**f – Page 18:**
**Page 23:** Kazgidromet 2016 Report (in Russian),
*http://www.kazhydromet.kz/files/userfiles/2016/bulleten/god/RUS_2016_year.docx*

**g – Page 24:** Screening study of atmospheric emissions from Bolashak plant,
Kazakhstan National Medical University (2013)(in Russian),
*http://kaznmu.kz/press/2013/05/31/прогнозная-оценка-риска-для-здоровья/*

**h – Page 26:** Oil Spill Response brochure (2010),
*http://www.ncoc.kz/pdf/publications/NCOC_Oil%20spill_en.pdf*

**i – Page 27:** OSPRI 2016 Report,
*http://ospri.moonfruit.com/*

**j – Page 34:** NCOC Good Neighbour brochure (2012),
*http://www.ncoc.kz/pdf/publications/NCOC_Societal_brochure_2012_en_web.pdf*

**k – Page 34:**
**Page 38:** NCOC Local Content brochure (2014),
*http://www.ncoc.kz/en/docs/LocalContentBrochureEng.PDF*

**l – Page 37:** NCOC Local Content policy
*http://www.ncoc.kz/en/oil-and-gas/local_content/*

**m – Page 37:** 2012 Aktau Declaration,
*http://www.ncoc.kz/en/oil-and-gas/AktauDeclaration.aspx*

**n – Page 38:** NCOC contractor success stories (downloadable),
*http://www.ncoc.kz/en/oil-and-gas/local_content/video.aspx*

**o – Page 38:** NCOC Vendor process,
*http://www.ncoc.kz/en/work/vqprocess.aspx*

**p – Page 38:** NCOC Vendor qualification and market intelligence,
*http://www.ncoc.kz/en/oil-and-gas/local_content/cooperation.aspx*

**q – Page 43:** NCOC General Business Principles
*http://www.ncoc.kz/en/docs/General%20Business%20Principles%20en.pdf*

**r – Page 43:** NCOC Code of Conduct,
*http://www.ncoc.kz/en/docs/Code%20of%20Conduct%20en.pdf*

**s – Page 43:** KazEnergy scholarship programs (in Russian),
*http://www.kazenergy.com/ru/obrazovatelnaya-programma/-kazenergy/14048-2016-02-16-03-03-29.html*

**t – Page 49:** Voluntary Principles on Security and Human Rights,
*http://www.voluntaryprinciples.org/for-companies*

## FEEDBACK

We would be grateful if you send your comments and questions relating to NCOC N.V. Sustainability report 2016 to our email address: ***sustainability@ncoc.kz***
This will help improve the quality of our work.

.



NORTH CASPIAN OPERATING COMPANY N.V.

1, Smagulov St., NCOC office
060002, Atyrau, Republic of Kazakhstan