

REPORT N° 70016996-001

# ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT - GAP ANALYSIS AND AUDIT

GOLDMAN SACHS GAS STORAGE PROJECT,  
UKRAINE

MARCH 2016

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GOLDMAN SACHS GAS STORAGE  
PROJECT, UKRAINE

## **Draft Version 5**

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Date: March 2016

## **WSP | Parsons Brinckerhoff**

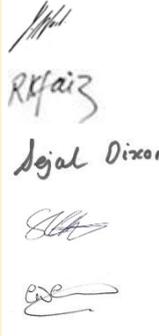
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## APPENDICES

### **A P P E N D I X A DOCUMENTATION**

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### **A P P E N D I X B ESAP**

APPENDIX B-1 ESAP

### **A P P E N D I X C RISK MATRIX**

# ABBREVIATIONS

ACM	Asbestos Containing Material
AST	Above-Ground Storage Tank
BarG	Bar Gauge
BAT	Best Available Technique
bcm	Billion Cubic Meters
BOD	Biological Oxygen Demand
CCTV	Closed-Circuit Television
CFC	Chlorofluorocarbon
Cm/sec	Centimetres per Second
CO	Carbon Monoxide
CO <sub>2</sub>	Carbon Dioxide
COD	Chemical Oxygen Demand
dB	Decibel
dBA	A-weighted Decibel
EBRD	European Bank for Reconstruction and Development
EHS	Environment, Health, and Safety
EHSS	Environment, Health, Safety and Social
EIA	Environmental Impact Assessment
ESAP	Environmental and Social Action Plan
ESDD	Environmental and Social Due Diligence
ESMS	Environmental and Social Management System
ERP	Emergency Response Plan
EU	European Union
EC	Exceeding Compliance
FC	Fully Compliant
g/L	Grams per Litre
GHG	Greenhouse Gases
GIIP	Good International Industry Practice
GMS	Gas Metering Stations
GTS	Gas Transmission System
ha	Hectare
HAZID	Hazard Identification
HAZOP	Hazard and Operability Study
HCFC	Hydrochlorofluorocarbons
HFC	Hydrofluorocarbons
HR	Human Resources
H&S	Health and Safety
IFC	International Finance Corporation
ILO	International Labour Organisation
IMS	Integrated Management System
ISO	International Organization for Standardization
km	Kilometer
KPI	Key Performance Indicator
KWh	Kilowatt Hour

LAH	Level Alarm High
LAHH	Level Alarm High-High
LEL	Lower Explosive Limit
LOTO	Lockout Tagout
LRP	Livelihood Restoration Plan
Lux	Lumen per Square Meter
m	Meter
mcG/h	Micrograms pr Hour
Mn	Manganese
MN	Material Non-compliance
MW	Megawatt
MWth	Megawatt Thermal
m <sup>3</sup>	Cubic Meters
mg/m <sup>3</sup>	Milligram per Cubic Meter
N/A	Not Applicable
NGO	Non-Governmental Organisation
NJSC	National Joint Stock Company
NO <sub>x</sub>	Nitrous Oxide
NO <sub>2</sub>	Nitrogen Dioxide
NOP	No Opinion Possible
NORM	Naturally Occurring Radioactive Material
O <sub>2</sub>	Oxygen
OHS / OSH	Occupational Health and Safety
OPIC	Overseas Private Investment Corporation
OVNS	Acronym for national Environmental Impact Assessment (Otsinka vplyvu na navkolyshnye seredovyshche)
PC	Partially Compliant
PCBs	Polychlorinated Biphenyls
PJSC	Public Joint Stock Company
PPE	Personal Protective Equipment
PPM	Parts per Million
PS	Performance Standard
PTW	Permit to Work
SPZ	Sanitary Protection Zone
SEP	Stakeholder Engagement Plan
SER	State Environmental Review
SF <sub>6</sub>	Sulphur Hexafluoride
SO <sub>2</sub>	Sulphur Dioxide
TIGF	Transport et Infrastructures Gaz France
TSS	Total Suspended Solids
UAH	Ukrainian Hryvnia
UGS	Underground Gas Storage
UGSF	Underground Gas Storage Facility
USD	US Dollars
UST	Under-Ground Storage Tank
WSP   PB	WSP   PB UK Limited

# 1 EXECUTIVE SUMMARY

## 1.1 BACKGROUND

Goldman Sachs is considering a potential investment into National Joint Stock Company (NJSC) Naftogaz of Ukraine (Naftogaz) gas storage systems based in the Ukraine. The investment (also herein referred to as the Project) involves the purchase of gas which will be held at one of five gas storage facilities in Western Ukraine.

WSP | Parsons Brinckerhoff has been commissioned by Goldman Sachs to undertake an Environmental and Social Due Diligence review, including audit, for the corporate systems of Naftogaz and its subsidiaries and the five storage facilities in Ukraine. This review is undertaken in advance of the potential investment in the business by Goldman Sachs.

The review is against the Overseas Private Investment Corporation (OPIC) Environmental and Social Policy Requirements, which include substantial reference to the International Finance Corporation (IFC) Performance Standards and Environment Health and Safety Guidelines. The scope of review with respect to IFC Performance Standard 2 Labor and Working Conditions is review of occupational health and safety which together with process safety are considered as critical topics addressed in the audit.

## 1.2 PROPOSED INVESTMENT

The investment (or Project) would involve the purchase of gas which will be temporarily held at one of five gas storage facilities prior to onward sale.

Due to the nature of the potential transaction it is understood that it would not entail the construction of any new facilities, equipment, or other associated activities.

The facilities have been in operation for many years and original site selection criteria were not available as part of this review. As the investment will not involve the construction of any new facilities, new site identification processes will not be required.

## 1.3 AUDIT SUMMARY

For the purposes of this due diligence, the physical scope of the facilities is considered to primarily encompass the equipment and activities within the site fence line. Consideration has also been given to the presence of the up to 1km sanitary protection zone (SPZ) for each facility.

Review has also been conducted of general Environment, Health and Safety, and Security management systems including associated monitoring and reporting mechanisms.

In combination, this is considered as the area of influence of the proposed investment.

An Environment, Health and Safety, and Security audit has been carried out of the provided project documentation along with site visits to each of the storage facilities and to both Naftogaz and Public Joint Stock Company (PJSC) Ukrtransgaz (Ukrtransgaz) headquarters in Kiev.

No new land or physical or economic resettlement is required for the proposed investment and no significant impacts on biodiversity, cultural heritage, or indigenous peoples are expected. Performance Standard 5 Land Acquisition and Involuntary Resettlement and Performance Standard 8 Cultural Heritage are therefore not triggered for the project. The general approach to land management and precautionary management system elements such as chance finds procedures have therefore been included in commentary on Performance Standard 1

Assessment and Management of Environmental and Social Risks and Impacts to provide a comprehensive picture of the management system within which the Project will operate.

From both an occupational and process safety perspective, based on the inherent hazardous nature of the sites / activities they would be considered Major Hazard sites in USA / European Union (EU) and within the Ukrainian framework they are classified as the equivalent of Top Tier. Although the probability of a major fire / explosion event is very low, the potential consequences are substantial and could involve loss of life (irreversible) and significant off site property damage. However, the facility hazards are well managed and the risk is as low as reasonably practicable. No major residual hazard related risks were found to be relevant to the sites. From the audit, safety is viewed as the most important risk management area, therefore it is expected that those risk should be pro-actively managed and minimised so far as is reasonably practicable.

It is considered that there are a number of recommendations proposed, which are subject to further review by all parties, and which are included in an Environmental and Social Action Plan to ensure that the project is fully aligned with OPIC Environmental and Social Policy Requirements, including IFC performance standards and guidelines.

A summary of the key actions areas are provided in Table 1-1 below.

**Table 1-1 Key Actions**

REVIEW AREAS	ACTION AREAS
IFC PS 1 ASSESSMENT AND MANAGEMENT OF ENVIRONMENTAL AND SOCIAL RISKS AND IMPACTS	<ul style="list-style-type: none"> <li>■ Develop Company's standard and procedures on impact assessment, including land acquisition, community impacts, and cultural heritage, in line with IFC Performance Standard 1. (Environmental and Social Action Plan No. 1.2, Risk Rating: Medium)</li> <li>■ Naftogaz to continue to develop its integrated Environment, Health and Safety, and Security management system to achieve compliance with requirements of IFC Performance Standards. (Environmental and Social Action Plan No. 1.1, Risk Rating: Low)</li> <li>■ As part of the development of the Environmental and Social Management System clearly define a training programme. (Environmental and Social Action Plan No. 1.1, Risk Rating: Low)</li> <li>■ Expand Company's communication programme to include a stakeholder engagement programme compliant with IFC Performance Standard 1. (Environmental and Social Action Plan No. 1.3, Risk Rating: Medium)</li> <li>■ In addition to the key action areas above OPIC will continue to assess any additional external reporting needs for the project.</li> </ul>
IFC PS 2 LABOR AND WORKING CONDITIONS	<ul style="list-style-type: none"> <li>■ It is recommended that an Occupational Health &amp; Safety Management system consistent with an internationally recognised standard is implemented. (Environmental and Social Action Plan No. 2.1, Risk Rating: Low)</li> <li>■ It is recommended that the training plan at the Bogorodchany site is reviewed to include refresher and safety orientated training. (Environmental and Social Action Plan No. 2.2, Risk Rating: Medium)</li> <li>■ It is recommended that the safety culture is improved and Accident/Incident/Near miss reporting should be encouraged rather than penalised. (Environmental and Social Action Plan No. 2.3, Risk Rating: Low)</li> <li>■ It is recommended that audits of the use of the Permit to Work system are conducted to ensure appropriate controls are being used. (Environmental and Social Action Plan No. 2.4, Risk Rating: Medium)</li> <li>■ It is recommended that the internal audit scope and methodology is reviewed. (Environmental and Social Action Plan No. 2.5, Risk Rating: Medium)</li> <li>■ It is recommended that the sites review their management of noise exposure, PPE usage, availability and enforcement. (Environmental and Social Action Plan No. 2.6, Risk Rating: Medium)</li> </ul>

REVIEW AREAS	ACTION AREAS
	<ul style="list-style-type: none"> <li>■ It is recommended that all lifting equipment is marked with its safe working load. (Environmental and Social Action Plan No. 2.12, Risk Rating: Medium)</li> <li>■ It is recommended that a full survey of all sites is carried out to identify the required safety signage as well as the condition and adequacy of current signage. (Environmental and Social Action Plan No. 2.7, Risk Rating: Low)</li> <li>■ Recommend a strict enforcement of the control of ignition sources and the carrying of non-intrinsically safe mobile phones on site should not be allowed at all. (Environmental and Social Action Plan No. 2.8, Risk Rating: Medium)</li> <li>■ It is recommended that leak/ fume detection and fire/ smoke detection to be installed in ancillary buildings that house safety critical equipment. (Environmental and Social Action Plan No. 2.9, Risk Rating: Medium)</li> <li>■ It is recommended that the sites adopt and implement internationally recognised risk assessment methodologies, e.g. Hazard Identification and Hazard and Operability for: New plant and process introduction; significant changes to existing plant and process; Management of Change and incorporate organisational change in scope. (Environmental and Social Action Plan No. 2.10, Risk Rating: Medium)</li> <li>■ It is recommended that a programme of inspections of access platforms is conducted and any necessary repairs / replacements made. (Environmental and Social Action Plan No. 2.11, Risk Rating: Low)</li> <li>■ It is recommended that cooling tower management is reviewed to ensure that sufficient maintenance, biocidal dosing and testing is conducted to minimise the potential for Legionella. (Environmental and Social Action Plan No. 2.13, Risk Rating: Medium)</li> <li>■ It is recommended that the plan should demonstrate that all types of probable emergency scenarios have been addressed. Areas for consideration should include major injuries and health effects, major environmental damage, fire, flood and storm. (Environmental and Social Action Plan No. 2.14, Risk Rating: Low)</li> <li>■ It is recommended that a simplified version of the emergency plan and steps should be made available for operators to access swiftly in the event of an incident. (Environmental and Social Action Plan No. 2.15, Risk Rating: Low)</li> <li>■ All sites should consider upgrading to closed-circuit television and/or motion sensors around the site boundary. (Environmental and Social Action Plan No. 2.16, Risk Rating: Low)</li> </ul>
<p><b>IFC PS 3 RESOURCE EFFICIENCY AND POLLUTION PREVENTION</b></p>	<ul style="list-style-type: none"> <li>■ Confirm that internationally recognized methodologies and reporting procedures have been used for quantification of emissions. An assessment of direct greenhouse gas emissions is being provided under separate cover for submission to OPIC. (Environmental and Social Action Plan No. 3.1(b), Risk Rating: Low)</li> <li>■ Conduct a review of post-collection waste tracking. (Environmental and Social Action Plan No. 3.1(f), Risk Rating: Low)</li> <li>■ Conduct a review of the control of the combustion units to ensure that NOx is minimised as far as practicable, in particular through reviewing the air feed to ensure that excessive NOx is not being produced as a result of high air feed. (Environmental and Social Action Plan No. 3.1(a), Risk Rating: Low)</li> <li>■ Conduct a review of management systems, operational &amp; maintenance processes and equipment for management of wastewater, stormwater and other water discharges against applicable Best Available Technique requirements. (Environmental and Social Action Plan No. 3.1(c), Risk Rating: Low)</li> <li>■ Review discharges of wastewater to identify potential sources of methanol and glycol recorded in sampling. Review concentrations of methanol and glycol in</li> </ul>

REVIEW AREAS	ACTION AREAS
	<p>discharges against appropriate international guidelines. (Environmental and Social Action Plan No. 3.1(d), Risk Rating: Medium). Completion of appropriate site investigations to determine the baseline soil and groundwater conditions below the sites. (Environmental and Social Action Plan No. 3.2, Risk Rating: Medium)</p> <ul style="list-style-type: none"> <li>■ Conduct a review of systems, processes and equipment for storage facilities for oil, fuel and chemicals against applicable Best Available Technique requirements. This should include bunding of storage tanks, containment of delivery areas, inspection programs for delivery hoses and underground pipework and improved spill response procedures and equipment. (Environmental and Social Action Plan No. 3.1(e), Risk Rating: Medium)</li> <li>■ Develop and implement asbestos management procedures. (Environmental and Social Action Plan No. 3.3, Risk Rating: Medium)</li> </ul>
<p>IFC PS 4 HEALTH AND SAFETY – COMMUNITY HEALTH, SAFETY, AND SECURITY</p>	<ul style="list-style-type: none"> <li>■ Recommend a strict enforcement of the control of ignition sources and the carrying of non-intrinsically safe mobile phones on site should not be allowed at all. (Environmental and Social Action Plan No. 4.1, Risk Rating: Medium)</li> <li>■ It is recommended that leak/ fume detection and fire/ smoke detection to be installed in ancillary buildings that house safety critical equipment. (Environmental and Social Action Plan No. 4.2, Risk Rating: Medium)</li> <li>■ It is recommended that cooling tower management is reviewed to ensure that sufficient maintenance, biocidal dosing and testing is conducted to minimise the potential for Legionella. (Environmental and Social Action Plan No. 4.3, Risk Rating: Medium)</li> <li>■ It is recommended that the plan should demonstrate that all types of probable emergency scenarios have been addressed. Areas for consideration should include major injuries and health effects, major environmental damage, fire, flood and storm. (Environmental and Social Action Plan No. 4.4, Risk Rating: Low)</li> <li>■ It is recommended that a simplified version of the emergency plan and steps should be made available for operators to access swiftly in the event of an incident. (Environmental and Social Action Plan No. 4.5, Risk Rating: Low)</li> <li>■ All sites should consider upgrading to closed-circuit television and/or motion sensors around the site boundary. (Environmental and Social Action Plan No. 4.6, Risk Rating: Low)</li> </ul>

These action areas have been provided as implementable Environmental and Social Action Plan actions that include the resources / estimated costs required, and a timetable for implementation and completion of the action, and the criteria for successful implementation. In some cases, the costs of these actions are based on the initial review actions and not the follow on implementation costs. The Environmental and Social Action Plan should be adopted and is provided in Appendix B.

# 2 INTRODUCTION AND PROJECT APPROACH

## 2.1 PROJECT BACKGROUND

Goldman Sachs is considering a potential investment into Naftogaz gas storage systems based in the Ukraine. The investment (also herein referred to as the Project) involves the purchase of gas which will be held at one of five gas storage facilities in Western Ukraine.

Naftogaz is a 100 per cent State-owned company reporting to the Ministry of Economic Development and Trade of Ukraine. Naftogaz is the holding of a vertically integrated group of entities with activities including oil and gas production, transportation and storage, refining and supply.

The gas storages are operated by Ukrtransgaz, the gas transmission operator in Ukraine. Ukrtransgaz is 100 per cent owned by Naftogaz.

Throughout this report the combined organisation of Naftogaz and Ukrtransgaz is also referred to as 'the organisation' or 'the company'.

WSP | Parsons Brinckerhoff (hereafter termed WSP | PB) has been commissioned by Goldman Sachs to undertake an Environmental and Social Due Diligence (ESDD) review for the corporate systems of Naftogaz and its subsidiaries and the five storage facilities in Ukraine. This review is undertaken in advance of the potential investment in the business by Goldman Sachs.

## 2.2 SCOPE OF WORK

The scope of work is as follows:

- Conduct a corporate Environment, Health, Safety and Social management review across the business.
- Assess the Environmental Impact Assessment (EIA) status for all relevant facilities.
- Conduct a review of Health and Safety and labour conditions.
- Assess the environmental and social risks and impacts associated with current operations.
- Assess past, ongoing and potential future stakeholder interactions.
- Develop an Environmental and Social Action Plan.

The audit is against the OPIC Environmental and Social Policy Requirements, which include substantial reference to the IFC Performance Standards (PSs) and Environment, Health and Safety (EHS) General Guidelines. The scope of review with respect to IFC Performance Standard 2 Labor and Working Conditions is review of occupational health and safety.

This report covers the Environment, Health and Safety, and Security (EHSS) corporate and site audit reviews with the Environmental and Social Action Plan (ESAP) provided in Appendix B.

Due to the nature of the potential transaction it is understood that it would not entail the construction of any new facilities, equipment, or any other associated activities.

## 2.3 OBJECTIVES

The objectives of this review were to conduct an ESDD review of a sample of Naftogaz Group's facilities in Ukraine with the results of the review incorporated into an ESAP to ensure compliance

with the OPIC Requirements, including the IFC Performance Standards and Environment, Health, and Safety (EHS) Guidelines. The review will focus on the investments financed by Goldman Sachs. Key to the review is an assessment of performance against the following standards and guidelines:

<b>OPIC - Environmental and Social Policy Statement</b>	
<b>IFC Performance Standards</b>	<b>IFC General EHS Guidelines</b>
<ul style="list-style-type: none"> <li>→ PS1: Assessment and Management of Environmental and Social Risks and Impacts</li> <li>→ PS2: Labor and Working Conditions</li> <li>→ PS3: Resource Efficiency and Pollution Control</li> <li>→ PS4: Community Health, Safety, and Security</li> <li>→ PS5: Land acquisition and Involuntary Resettlement</li> <li>→ PS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources</li> <li>→ PS7: Indigenous Peoples</li> <li>→ PS8: Cultural Heritage</li> </ul>	<ul style="list-style-type: none"> <li>→ Environmental <ul style="list-style-type: none"> <li>■ Air Emissions and Ambient Air Quality</li> <li>■ Energy Conservation</li> <li>■ Wastewater and Ambient Water Quality</li> <li>■ Water Conservation</li> <li>■ Hazardous Materials Management</li> <li>■ Waste Management</li> <li>■ Noise</li> <li>■ Contaminated Land</li> </ul> </li> <li>→ Occupational Health and Safety <ul style="list-style-type: none"> <li>■ General Facility Design and Operation</li> <li>■ Communication and Training</li> <li>■ Physical Hazards</li> <li>■ Chemical Hazards</li> <li>■ Biological Hazards</li> <li>■ Radiological Hazards</li> <li>■ Personal Protective Equipment (PPE)</li> <li>■ Special Hazard Environments</li> <li>■ Monitoring</li> </ul> </li> <li>→ Community Health &amp; safety <ul style="list-style-type: none"> <li>■ Water Quality and Availability</li> <li>■ Structural Safety of Project Infrastructure</li> <li>■ Life and Fire Safety</li> <li>■ Traffic Safety</li> <li>■ Transport of Hazardous Materials</li> <li>■ Disease Prevention</li> <li>■ Emergency Preparedness and Response</li> </ul> </li> <li>→ Construction and Decommissioning <ul style="list-style-type: none"> <li>■ Environment</li> <li>■ Occupational Health and Safety</li> </ul> </li> </ul>
<b>IFC Industry Sector EHS Guidelines</b>	
<ul style="list-style-type: none"> <li>→ Natural Gas Processing</li> <li>→ Onshore Oil and Gas Development</li> </ul>	

	■ Community Health and Safety
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The ESAP is included in this report (Appendix B).

## 2.4 AUDIT TEAM AND AUDITEE INVOLVEMENT

The WSP | PB team, including local associates, involved in the audit are listed in Table 2-1 below.

**Table 2-1 WSP | PB Staff**

NAME	ROLE
Neal Barker	Project Director and Technical Reviewer
Susan Wood	Project Manager and Environmental and Social Lead Auditor
Sarah Trevarthen	Environmental and Social Auditor
Colin Chambers	Occupational and Process Safety Auditor
Sejal Dixon	Occupational and Process Safety Auditor
Rukhsana Faiz	Occupational and Process Safety Auditor
Sergey Zima	Local EHS Consultant
Anna Minakova	Local EHS Consultant

A list of all meeting and site visit attendees from Naftogaz and Ukrtransgaz was not provided but included a wide range of senior personnel able to answer questions on all topics raised. The due diligence also included extensive correspondence with Sergiy Oleksiyenko, Chief Advisor to the Chairman of the Board, Naftogaz and Yury Volukhovskiy, Deputy Chief Engineer of Lvivtransgaz.

## 2.5 SITES VISITED AND STAKEHOLDER MEETINGS

The details of the sites visited and meetings held as part of the audit are presented in Table 2-2 Meetings and Sites Visited below.

**Table 2-2 Meetings and Sites Visited**

SITE/ MEETINGS	SPECIFIC AREAS VISITED / MEETINGS HELD	DATE VISITED
Corporate Headquarters Meetings	Naftogaz Head Office, Kiev Ukrtransgaz Head Office, Kiev (WSP   PB team attendees: Susan Wood and Rukhsana Faiz)	25-27 November 2015
Start-up Meeting	Lvivtransgaz Headquarters (Lviv) (WSP   PB team attendees: Susan Wood, Colin Chambers, Sarah Trevarthen, Sergey Zima)	08 December 2015
Oparske Facility	Full tour by WSP   PB (Susan Wood, Colin Chambers, Sarah Trevarthen, Sergey Zima)	08 December 2015
Uherske Facility	Full tour by WSP   PB (Colin Chambers, Sarah Trevarthen, Sergey Zima)	09 December 2015
Dashavske Facility	Full tour by WSP   PB (Susan Wood, Sejal Dixon, Anna Minakova)	09 December 2015
Start-up Meeting	Prykarpatttransgaz Headquarters (Ivano Frankivsk) (Sejal Dixon, Sarah Trevarthen, Sergey Zima)	10 December 2015
Bogorodchany Facility	Full tour by WSP   PB (Sejal Dixon, Sarah Trevarthen, Sergey Zima)	10 December 2015
Bilche-Volytsko-Uherske Facility	Full tour by WSP   PB (Rukhsana Faiz, Sarah Trevarthen, Sergey Zima)	11 December 2015

## 2.6 LIMITATIONS

The audit visits and interviews were conducted between the 8<sup>th</sup> and 11<sup>th</sup> December 2015 at the facilities detailed in Table 2-2 Meetings and Sites Visited<sup>2</sup> above. The work undertaken provides a good overview of the company operations but is necessarily limited by the amount of time allocated to the site visit and the staff available during this time.

WSP | PB has based its conclusions and recommendations on the information available, visual observations and the auditee responses. Although it does not affect the content of this review, it should be noted that photographs are not included in this report as they were generally prohibited for safety and / or security reasons. WSP | PB does not and cannot guarantee that the portfolio audited has no environmental or health and safety or social issues or liabilities beyond those observed during the audit. It may be necessary to modify the findings or conclusions presented in this report if additional information becomes available to WSP | PB at a later date. WSP | PB has reviewed reports and considered written records as part of this audit. However, WSP | PB has not verified the content or accuracy of this information.

This report was compiled for the benefit of the Goldman Sachs only. This report is not intended to be relied upon by third parties without prior written authorisation by WSP | PB.

## 2.7 REPORTS AND OTHER INFORMATION CONSULTED

The documentation that was consulted as part of this project is provided in Appendix A.

Of note, the European Bank for Reconstruction and Development (EBRD) has completed two other recent ESDDs with respect to Naftogaz and Ukrtransgaz.

The most recent ESDD was completed in 2015 and related to a trade finance loan to Naftogaz to bridge the gap between purchase and sale of natural gas. The project included the topic of setting standards of corporate governance and business conduct, with a focus on improving corporate governance of Naftogaz and Ukrtransgaz, and increasing transparency and standardisation of the procurement of natural gas from Ukraine's interconnectors with the European Union. The environmental and social due diligence included a review of Naftogaz corporate environmental and social policies and production of an ESAP.

The second ESDD was conducted in 2014 and included the Corporate Governance Review of Naftogaz and Ukrtransgaz technical cooperation that was developed in relation to the Naftogaz Emergency Pipeline Upgrade and Modernization sovereign loan to Ukraine. The first phase included a review of the regulatory and legislative frameworks governing corporate governance of Naftogaz and Ukrtransgaz and a review of the corporate governance practices at the two companies.

The ESDD also included a review of National EIA reports and other documents containing information on social issues, health and safety, community safety, land acquisition, etc., and other issues (e.g., the Environmental Policy of Ukrtransgaz, materials for preparing the land allotment project; samples of land-lease agreements; a methodology for assessing damages; an agreement on the establishment of the land use and a report of average selling price and crops yield; land transfer acts; socio-economic data for village councils located along the route of the Project, etc.). The ESAP developed as a result contains actions aimed at improving Ukrtransgaz's management systems, developing Construction Environmental Management Plans; obtaining required permits prior to the construction, etc.

The IFC has also recently approved an up to one year trade finance facility of up to US\$200 million to cover importation of natural gas to Ukraine during the winter season of 2015-2016 by

Naftogaz<sup>1</sup>. This will be used to finance the deliveries of ENGIE, a major European supplier of natural gas, under their natural gas supply framework contract with Naftogaz. The IFC notes that its support will help mitigate the risk of supply disruption by assisting Naftogaz's access to trade finance to cover its import needs, and diversify sources of supply, and will enable Naftogaz to guarantee another source of supply of gas to the market during the season when the demand of gas is extremely high which is essential to the country's economic and social development.

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<sup>1</sup> IFC website:

<http://ifcextapps.ifc.org/ifcext/spiwebsite1.nsf/DocsByUNIDForPrint/B80D96DDDA68CABF85257F0200764A41?opendocument>

# 3 PROPOSED INVESTMENT AND REGULATORY REQUIREMENTS

## 3.1 COMPANY OVERVIEW

Naftogaz is a 100 per cent State-owned company reporting to the Ministry of Economic Development and Trade of Ukraine. Naftogaz is the holding of a vertically integrated group of entities with activities including oil and gas production, transportation and storage, refining and supply.

Ukrtransgaz is a Public Joint Stock Company 100% owned by Naftogaz of Ukraine and is a leader in the transmission and storage of natural gas in Ukraine. Ukraine's gas transmission system (GTS) operates with an entry capacity of 288 billion cubic metres (bcm) / year and the exit capacity of 151 bcm / year in the direction of the EU. The annual volume of gas transmitted to the EU and Moldova in 2014 was 62.2 bcm (59.4 bcm to EU and 2.8 bcm to Moldova).

Ukrtransgaz also owns and operates one of Europe's most extensive underground gas storage networks, operating 12 underground storage facilities (UGSF) with a total active capacity of 31 bcm (and the injection capacity of 280 mcm / day) to provide storage services to both suppliers and consumers. The largest of the UGSFs is located at the border of Ukraine and the EU, and two UGSFs are situated in aquifer cavities with the remaining UGSFs utilising depleting gas fields.

Ukrtransgaz consists of 14 subsidiary units operating across Ukraine, including Lvivtransgaz which operates four of the five underground gas storages within the scope of this due diligence. The four underground storages within the Lviv Oblast are reported to represent 74% of the total active volume of gas storage of Ukrtransgaz.

Main activities of Ukrtransgaz include:

- Supply of natural gas to consumers in Ukraine;
- Natural gas transit through Ukraine to western and central Europe;
- Storage of natural gas in underground facilities (the focus of this due diligence);
- Operation, reconstruction and maintenance of trunk pipelines and associated infrastructure;
- Construction and installation of gas pipelines; and
- Research, design and project work for gas transportation and storage.

There are 755 Naftogaz employees and 21,696 Ukrtransgaz employees as detailed in Tables 3-1 and 3-2 below.

**Table 3-1 Naftogaz Employees**

Category	Men		Women	
Direct employees - total	330 no.	45,8 %	390 no.	54,2 %
Direct employees - full-time	324 no.	45,4 %	390 no.	54,6 %
Direct employees - part-time	6 no.	0,8 %	- no.	%
Agency employees - total	4 no.	%	- no.	%
Contractors/subcontractors	- no.	%	- no.	%
Seasonal workers	12 no.	1,7 %	19 no.	2,6 %

**Table 3-2 Ukrtransgaz Employees**

Category	Men		Women	
Direct employees - total	17514 no.	49,9 %	4097 no.	49,8 %
Direct employees - full-time	16850 no.	48,0 %	3967 no.	48,2 %
Direct employees - part-time	664 no.	1,9 %	130 no.	29,1 %
Agency employees - total	54 no.	0,2 %	31 no.	%
Contractors/subcontractors	no.	%	no.	%
Seasonal workers	no.	%	no.	%

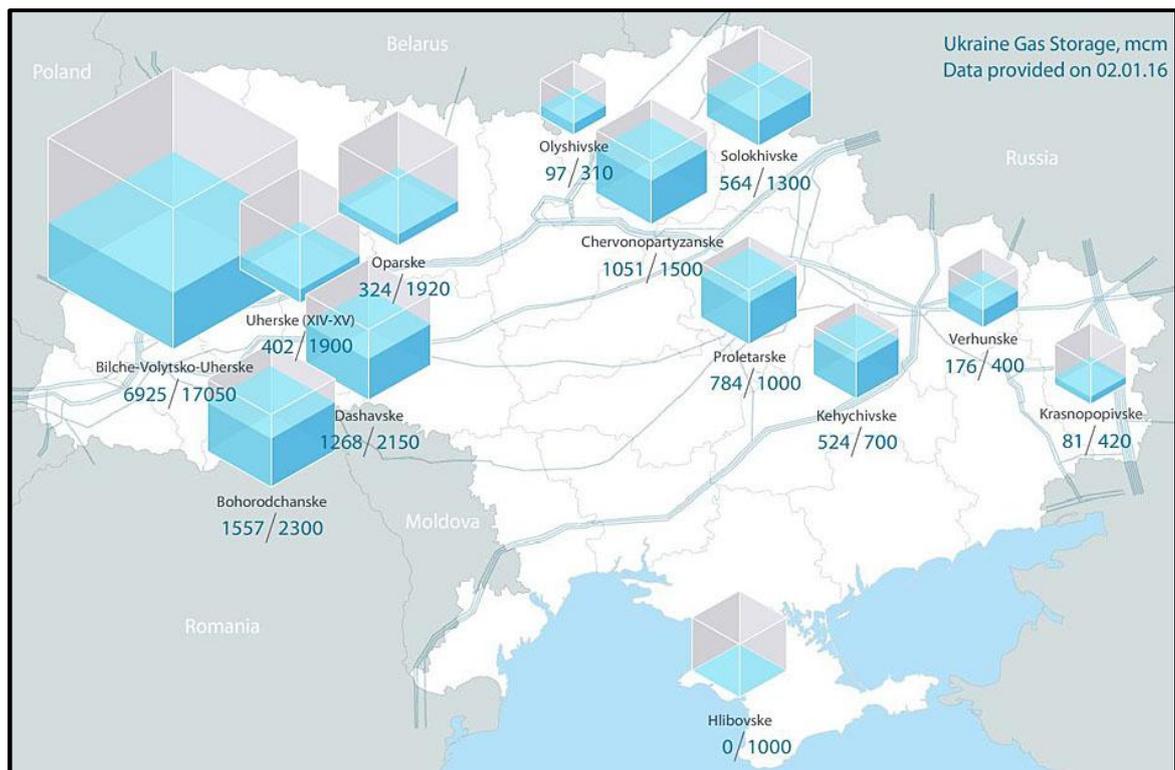
## 3.2 GAS STORAGE FACILITY OPERATIONS

Ukrtransgaz operates 10 depleted gas field facilities and two aquifer facilities with an aggregate capacity of approximately 31 bcm (nearly a quarter of the EU-28 total underground storage [UGS] capacity). The company started providing disaggregated data on gas balances in its UGSFs in May 2014 at AGSI+, the transparency platform operated by Gas Infrastructure Europe (data updated daily and accessed via <http://transparency.gie.eu/>).

Ukrtransgaz offers gas storage services to both gas suppliers and consumers.

Five major facilities are located at the western border of Ukraine at the key intersection of gas pipelines which connect Poland, Slovakia, Hungary and Romania. Map 3-1 shows the location of the gas storage assets. These five major assets are the focus of this review and these are described in Section 3.3 below. The majority of the natural gas delivered from Russia to Western Europe passes this strategic pipeline intersection. Ukraine has proposed to use this extensive natural gas transmission and storage agglomerate as the basis for an Eastern European Gas Hub; this project is currently being discussed with various stakeholders.

**Map 3-1 Map of Gas Storage Asset Locations and Capacities**



Gas Balances in Ukrainian Underground Storages

The total length of gas pipelines operated by Ukrtransgaz is 38,600 km. The GTS comprises 72 compressor stations, 1,458 gas distribution stations and 702 gas pumping units with a total capacity of 5,448 MW.

Since November 2014, Ukrtransgaz has published daily disaggregated data on transported gas volumes on the ENTSOG transparency platform (<https://transparency.entsog.eu/>) volume of gas transported through Ukraine decreased by 25% from 86.1 bcm in 2013 to 62.2 bcm in 2014. Internal transmission volumes have also decreased due to declining domestic demand to nearly 40 bcm.

Despite the decline in gas transmission volumes in 2014, the capacity utilisation of the Ukraine GTS is higher than a number of European GTSs and is comparable to Transport et Infrastructures Gaz France (TIGF) in France.

GTS maintenance is predominantly performed inhouse. Internal divisions of Ukrtransgaz:

- Operate, maintain and renovate pipelines, compressors and other system components;
- Diagnose, test and certify the equipment;
- Construct and install high and low pressure gas pipelines; and
- Conduct research, engineering and design works related to gas transmission and storage.

Gas volumes entering the Ukraine GTS (plus physical and technical characteristics) are carefully measured. Similarly, the volume and quality of gas is monitored at all points where it exits the Ukraine GTS and enters transmission systems of neighbouring countries. These measurements on the gas are taken at gas metering stations (GMS) located at the eastern and western Ukrainian borders using high precision automatic glass flow measurements and quality control monitoring devices.

### 3.3 GAS STORAGE / TRANSMISSION ASSET DETAILS

The UGSFs that are within the scope of this review are described in greater detail below.

#### OPARSKE FACILITY

The facility started gas production in 1979, making it the third oldest facility in Ukraine, with new buildings and equipment added over time. The facility is registered with the State as a High Hazard site (equivalent to a Seveso site within the EU) and a 1<sup>st</sup> Category Fire and Explosion sites.

The site is approximately 20 ha in size and includes: an administrative building; a fire depot and associated 700m<sup>3</sup> underground water storage; a boiler house and water softening house for the boiler; a substation and emergency diesel generator; oil and produced water tanks; drying and regeneration units; compressors units; gas receiving and metering facilities; extensive associated pipework and concrete slab construction surfaces, and a wastewater treatment plant. There is no worker accommodation on site.

The eastern half of the site was described as being completely new (constructed in 2007) and reconstruction works are still ongoing.

Part of the reconstruction works include works at the boiler house to modernise the technology, which is planned to save energy and reduce emissions. Three gas-fired 3 MW boilers will be installed as replacements for the existing boilers, with one to two in operation at any one time.

Staffing of the site includes up to 10 security guards and various administrative personnel and operations staff, including an environmental engineer.

Associated offsite locations include well heads and hundreds of km of gas lines feeding to the site.

#### UHERSKE FACILITY

The facility was constructed in 1975, with no significant changes to layout since that time. The facility is registered with the State as a High Hazard site (equivalent to a Seveso site within the EU) and a 1<sup>st</sup> Category Fire and Explosion site.

The site is approximately 20 ha in size and facilities include: an administrative building; two underground firewater tanks; fire pump house, boiler house; maintenance workshop; a substation; drying and regeneration units; twenty compressors units; gas receiving and metering facilities; underground oil and glycol tanks; extensive associated pipework and concrete slab construction surfaces; and water abstraction wells. There is no worker accommodation on site.

Staffing of the site includes security guards, administrative personnel, and operations and canteen staff.

Associated offsite locations include well heads (total 122 wells, with 88 operational) and gas lines feeding to the site.

#### DASHAVSKE FACILITY

The facility started gas production in 1924, with creation of storage in 1973 (pilot operation) making it the oldest facility in Ukraine, with new buildings and equipment added over time. The facility is registered with the State as a High Hazard site. It was described that there are 144 staff employed at the site.

The site facilities include: an administrative building; canteen; a fire water pond and pumping station and truck; produced water storage pond; small potable water generation facility; a boiler house and water softening for the boiler; maintenance workshop; a substation; drying and regeneration units; six compressor units; gas receiving and metering facilities; oil and ethylene

glycol tanks; extensive associated pipework and concrete slab construction surfaces; and an emergency diesel generator. There is no worker accommodation on site.

Staffing of the site includes security guards, administrative personnel, and operations staff.

Associated offsite locations include well heads and gas lines feeding to the site.

### BOGORODCHANY FACILITY

The site was developed in 1967 as a gas production facility (7 wells) and expanded to include gas storage in 1979. The facility is registered with the State as a High Hazard site (equivalent to a Seveso site within the EU) and a 1<sup>st</sup> Category Fire and Explosion site.

The area within the site fence is approximately 15 ha in size and facilities include: an administrative building; canteen; fire pump house; boiler house; maintenance workshop; drying and regeneration units; ten compressor units; gas receiving and metering facilities; above ground oil and glycol tanks; underground diesel and petrol and produced water tanks; extensive associated pipework; concrete slab construction surfaces; and firewater water abstraction. There is no worker accommodation on site.

Staffing of the site includes security guards, administrative personnel, and operations and canteen staff.

Associated offsite locations include well heads (total 172 wells) and gas lines feeding to the site.

### BILCHE-VOLYTSKO-UHERSKE FACILITY

The facility was constructed in 1985-92 in 3 stages. Since 1992, significant alterations have occurred, including installation of 3 stage pumping (different pressures), a pigging unit and new gas drying units. The facility is registered with the State as a High Hazard site (equivalent to a Seveso site within the EU) and a 1<sup>st</sup> Category Fire and Explosion site.

The site is approximately 19 ha in size and facilities include: an administrative building; two in-ground firewater tanks; fire pump house; boiler house; maintenance workshop; a substation; drying and regeneration units; 28 compressor units; gas receiving and metering facilities; waste water treatment plant; above ground oil and glycol tanks; extensive associated pipework; and, concrete slab construction surfaces. There is no worker accommodation on site.

Staffing of the site includes security guards, administrative personnel, and operations and canteen staff.

Associated offsite locations include well heads (total 418 wells, with 341 operational) and gas lines feeding to the site.

## 3.4 DETAILED INVESTMENT PROGRAMME OVERVIEW

### INVESTMENT PLANS

Goldman Sachs is considering a potential investment into the gas storage systems described in Section 3.3. The investment (or Project) would involve the purchase of gas which will be temporarily held at one of five gas storage facilities prior to onward sale.

Due to the nature of the potential transaction it is understood that it would not entail the construction of any new facilities, equipment, or any other associated activities.

### SITE IDENTIFICATION PROCESSES

The facilities have been in operation for many years and original site selection criteria were not available as part of this review. As the investment will not involve the construction of any new facilities, new site identification processes will not be required.

## AREA OF INFLUENCE

For the purposes of this due diligence, the physical scope of the facilities is considered to primarily encompass the equipment and activities within the site fenceline. Consideration has also been given to the presence of the up to 1km sanitary protection zone for each facility.

Review has also been conducted of general EHSS management systems including associated monitoring and reporting mechanisms.

In combination, this is considered as the area of influence of the proposed investment.

## 3.5 REGULATORY REQUIREMENTS

### NATIONAL PLANNING REGULATIONS

Prior to construction (including extension and rehabilitation works), an Environmental Impact Assessment (abbreviated to OVNS in Ukrainian) is required to be undertaken; a requirement that was introduced in 1988. The existing environmental assessment system in Ukraine is more compliance-based requiring regulatory requirements and approval procedures to be fully met whilst the international best practice focuses more on risk mitigation, including specifying mitigation to be employed, and expands on the social and economic component of the assessment.

There are many legal and regulatory requirements on environmental assessment and the project approval process in Ukraine. Those regulations that are directly relevant are listed, but not limited to, the following:

**Table 3-3 Summary of Key Regulatory Requirements**

LEGISLATION	SUMMARY
<b>The Law of Ukraine on Environmental Protection, 1991</b>	<p>The Law of Ukraine on Environmental Protection, 1991 is the main umbrella Environmental Law in Ukraine that sets out the overall framework for environmental management and policy making in the country, including environmental assessment requirements. It stipulates that the Ministry of Environment carries out State Environmental Review (SER) with the following objectives: (a) to determine the level of ecological safety of an activity; (b) to establish compliance of project design materials with environmental regulations; and (c) to assess whether the planned mitigation measures are adequate and sufficient. The conclusions of SER are binding, and positive conclusions of SER are required for project approval.</p> <p>The Law also stipulates that project design documentation should include EIA materials. The EIA is carried out taking account of environmental regulatory requirements, ecological carrying capacity and state of environment at the site location, environmental forecasts, socio-economic development outlook of the region, and expected cumulative negative environmental impacts.</p>

LEGISLATION	SUMMARY
<b>The Law of Ukraine on Environmental Review, 1995</b>	<p>The Law of Ukraine on Environmental Review, 1995 specifically deals with environmental assessment and review in more detail. It sets the requirements and the process for carrying out state and public environmental review. Main provisions of the Law include the following:</p> <ul style="list-style-type: none"> <li>→ Environmental review in Ukraine is focused on determining the level of compliance of planned activity with respective regulatory requirements;</li> <li>→ The Law stipulates requirements to review project alternative options, and to incorporate public opinion about the project;</li> <li>→ Materials submitted for SER should include an EIA report as a separate volume, and a Statement of Environmental Consequences of planned activities (published in local media) as part of this volume; and</li> <li>→ EIA report materials should include: substantiation and description of planned activities; information about alternatives; environmental baseline; types and levels of impacts in normal and emergency conditions; possible qualitative environmental changes; ecological and economic consequences; and mitigation measures.</li> </ul>
<b>Ukrainian State Construction Norm on EIA Components and Content, DB A.2.2-1-2003 with amendments in 2010</b>	<p>This is the most comprehensive national regulation for EIA in Ukraine that details specific requirements for components, procedure and content of the EIA on construction activities.</p>
<b>The Law of Ukraine On Ratification of the Convention on the Environmental Impact Assessment in a Transboundary Context (Espoo Convention), 1999</b>	<p>The Espoo Convention and the Rio Declaration on Environment and Development (1992) state:</p> <ul style="list-style-type: none"> <li>→ Principle 17: Environmental impact assessment, as a national instrument, shall be undertaken for proposed activities that are likely to have a significant adverse impact on the environment and are subject to a decision of a competent national authority.</li> <li>→ Principle 19: States shall provide prior and timely notification and relevant information to potentially affected States on activities that may have a significant adverse transboundary environmental effect and shall consult with those States at an early stage and in good faith.</li> </ul> <p>Article 3 of the Convention on Environmental Impact Assessment in a Transboundary Context states that:</p> <p>“For a proposed activity listed in Appendix I that is likely to cause a significant adverse transboundary impact, the Party of origin shall, for the purposes of ensuring adequate and effective consultations under Article 5, notify any Party which it considers may be an affected Party as early as possible and no later than when informing its own public about that proposed activity”.</p>

The OVNS development process is guided by Ukrainian legislation, Ukrainian Standard DUST ISO-14001-97 and effective State construction, sanitary, fire safety and local environmental conditions and limitations.

Other legal and regulatory requirements relevant to the environmental assessment and project approval process include:

- Resolution of the Cabinet of Ministers No 483 On the Order of Approval of Investment Programs and Construction Projects and Their Comprehensive State Review, 2002;
- Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (Aarhus Convention), 1999; and.

- Ministry of Environment Guidelines for Public Participation in Environmental Decision-Making, 2004.

Although there is work underway in Ukraine to review national legislation against EU legislation to develop potential steps toward greater integration, the Ukraine is not an EU Member State and therefore EU controls such as the Industrial Emissions and EIA Directives are not applicable.

## UKRAINIAN REQUIREMENTS FOR SANITARY PROTECTION ZONES (SPAS)

The requirements for Sanitary Protection Zones (SPZ) are set forward in the State Sanitary Rules for Planning and Construction of Human Settlements approved by the Order N173 of the Ministry of Health of Ukraine on 19.06.1996 (with amendments).

This document deals with various aspects of placing human settlements and various other associated facilities, and includes a number of annexes that set specific distances (thereby establishing the Sanitary Protection Zone) between settlements and facilities that may impact human health by means of air pollution, noise, vibration, radiation, electro-magnetic fields, and other negative factors.

SPZ is measured from the source of impact (e.g. air pollution) to the nearest settlement area. The impact factor, such as concentration of specific air pollutant, should be within the hygienic legal limit at the outer boundary of the SPZ. The following facilities are not allowed in Sizes:

- Human settlements, hotels, dormitories;
- Schools, kindergartens;
- Hospitals;
- Recreational facilities, parks, gardening cooperatives, sports facilities; and
- Facilities for the supply of drinking water and their protection zones.

Specific allocation of SPZ distances is based on sanitary classification of enterprises, industries and facilities. This classification is provided in Annex 4 for industries, Annex 5 and Annex 15 for agricultural farms and manure management sites, Annex 12 for wastewater treatment facilities, and Annex 13 for water protection zones around surface water bodies.

It is possible to reduce SPZ in cases when, by means of calculation and laboratory research, it is proved that the legal pollution limits are not exceeded at the boundary of human settlement. Such a reduction of SPZ should be approved by the Chief State Sanitary Doctor of Ukraine.

According to the State Sanitary Rules, facilities for gas production including gas purification and compression of gas should have a SPZ of 1,000 m.

## OTHER NATIONAL REGULATIONS

Individual national legislation and regulation is furthered referenced throughout this report, but includes:

- Law of Ukraine on "Environmental Protection" of 25.06.91 №1264-XII
- Law of Ukraine on "Air Protection" of 16.10.92. №2707-XII
- Law of Ukraine on "Land Protection" of 19.06.03 №962-IV
- Law of Ukraine on "Waste" from 05.03.98 №187 / 98-BP
- Law of Ukraine "On Extra-Hazardous Facilities" dated 18.01.2001 No. 2245-III
- Subsoil Code of Ukraine from 27.07.94 №187 / 98-BP
- Land Code of Ukraine from 25.10.01 №2768-III
- Water Code of Ukraine from 06.06.95 №213 / 95-VR
- State Regulations on Hazardous Works (COVE 49.5 30019801-101:2102)

- State Safety Codes
- Labour Code of Ukraine (1972, as amended)
- Code of Civil Defence of Ukraine dated 02.10.2012 No.5403-VI
- Resolution by the Cabinet of Ministers of Ukraine dated 26.01.15 No.18 “On the State Commission for Technogenic and Environmental Safety and Emergencies”

Ukraine has ratified all 8 Fundamental International Labour Organisation (ILO) conventions.

Naftogaz reported that they have not identified any areas of their operations where EU environmental requirements are more stringent than local requirements. In order to identify and track gaps with EU environmental requirements, representatives of the Company participate in public hearings on the draft updated Strategic Environmental Policy of Ukraine with respect to the European Union project. This includes the involvement of the Ministry of Ecology and Natural Resources of Ukraine. However, during meetings with Naftogaz they did note that much of the domestic equipment that is used does not meet EU requirements for Best Available Techniques (BAT). Compliance with BAT is discussed in detail in Section 6 of this report.

### 3.6 OPIC AND IFC REQUIREMENTS

The international standards which will apply to the Project are:

- Standards adopted by the Overseas Private Investment Corporation, described in its Consolidated Environmental and Social Policy Statement (October 2010).

This includes:

- The World Bank Group EHS Guidelines, including the International Finance Corporation Performance Standards and associated Sector Guidelines.
- All relevant international conventions etc., including the conventions and recommendations of the International Labour Organization.

#### OPIC ENVIRONMENTAL AND SOCIAL POLICY STATEMENT

Opic’s environmental and social policies and procedures are described in the OPIC Environmental and Social Policy Statement<sup>2</sup>. This includes guidance on: screening and categorization; environmental and social review; environmental and social standards; public consultation and disclosure; conditions and compliance; monitoring; climate change and renewable energy; and, country eligibility related to labour.

At a minimum, OPIC requires that all projects must meet the IFC Performance Standards, applicable Industry Sector Guidelines, and host country laws, regulations and standards related to environmental and social performance, including host country obligations under international law.

#### WORLD BANK GROUP EHSS STANDARDS

The EHS Guidelines produced by the World Bank Group are technical reference documents on cross-cutting environmental, health, and safety issues applicable to all industry sectors. They cover general and industry-specific examples of Good International Industry Practice (GIIP), as defined in IFC PS 3 on Pollution Prevention and Abatement.

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<sup>2</sup> [https://www.opic.gov/sites/default/files/consolidated\\_esps.pdf](https://www.opic.gov/sites/default/files/consolidated_esps.pdf)

## GENERAL GUIDELINES

The General EHS Guidelines (April 2007) contain the performance levels and measures that are normally acceptable to the IFC and are generally considered to be achievable in new facilities at reasonable costs by existing technology.

When host country regulations differ from the levels and measures presented in the EHS Guidelines, projects are expected to achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, a full and detailed justification for any proposed alternatives is needed as part of the site-specific environmental assessment. This justification should demonstrate that the choice for any alternate performance levels is protective of human health and the environment.

## SECTOR GUIDELINES

Specific industry EHS Sector guidelines relevant to the Project are:

- Natural Gas Processing (April, 2007)
- Onshore Oil and Gas Development (April, 2007)

## PERFORMANCE STANDARDS

To manage the social and environmental risks and impacts of IFC projects, the IFC has developed a number of environmental and social Performance Standards. The IFC PS, updated in 2012, and the accompanying Guidance Notes are applicable to this Project.

IFC PS indicate that the party responsible for implementing and operating the project must comply with the applicable national laws, including those laws implementing host country obligations under international law. The project operator is also required to meet the requirements of the standards throughout the life of an investment by IFC or other relevant financial institution. These are as follows:

Performance Standard 1	Assessment and Management of Environmental and Social Risks and Impacts
Performance Standard 2	Labour and Working Conditions
Performance Standard 3	Resource Efficiency and Pollution Prevention
Performance Standard 4	Community Health, Safety, and Security
Performance Standard 5	Land Acquisition and Involuntary Resettlement
Performance Standard 6	Biodiversity Conservation and Sustainable Management of Living Natural Resources
Performance Standard 7	Indigenous Peoples
Performance Standard 8	Cultural Heritage

The scope of review with respect to IFC Performance Standard 2 Labor and Working Conditions is review of occupational health and safety. Based on information provided online by the European Bank for Reconstruction and Development<sup>3</sup>, Indigenous People, as recognised by government, are not present in Ukraine. Performance Standard 5 Land Acquisition and Involuntary Resettlement and Performance Standard 8 Cultural Heritage are not specifically triggered for the project. The general approach to land management and precautionary management system elements such as chance finds procedures have therefore been included in commentary on Performance Standard 1 Assessment and Management of Environmental and Social Risks and Impacts to provide a comprehensive picture of the management system within which the Project will operate.

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<sup>3</sup> <http://www.ebrd.com/news/publications/guides/guidance-note-on-indigenous-peoples.html>



# 4 PROJECT SETTING

## 4.1 SITE LOCATIONS

Map 3-1 in Section 3 above shows all the gas storage assets in Ukraine at a high-level. Four of the five sites are located in Lviv Oblast (region), with the fifth site, Bogorodchany in Ivano-Frankivsk Oblast.

Physical addresses of the sites were requested but not provided as part of this review. The facilities were therefore identified by the audit team using Google maps imagery. An image of each site is show in Figures 4-1 to 4-5 below. Each image shows an area of at least 1 km around each site. The distance indicated is the distance provided by Google Maps and has not been verified in the field.

**Figure 4-1 Bogorodchany Gas Storage Facility (located between the settlements of Bogorodchany and Sadzhava)**



Figure 4-2 Dashavske Gas Storage Facility (near Dashava and Yosypovychi villages, Lviv Oblast)

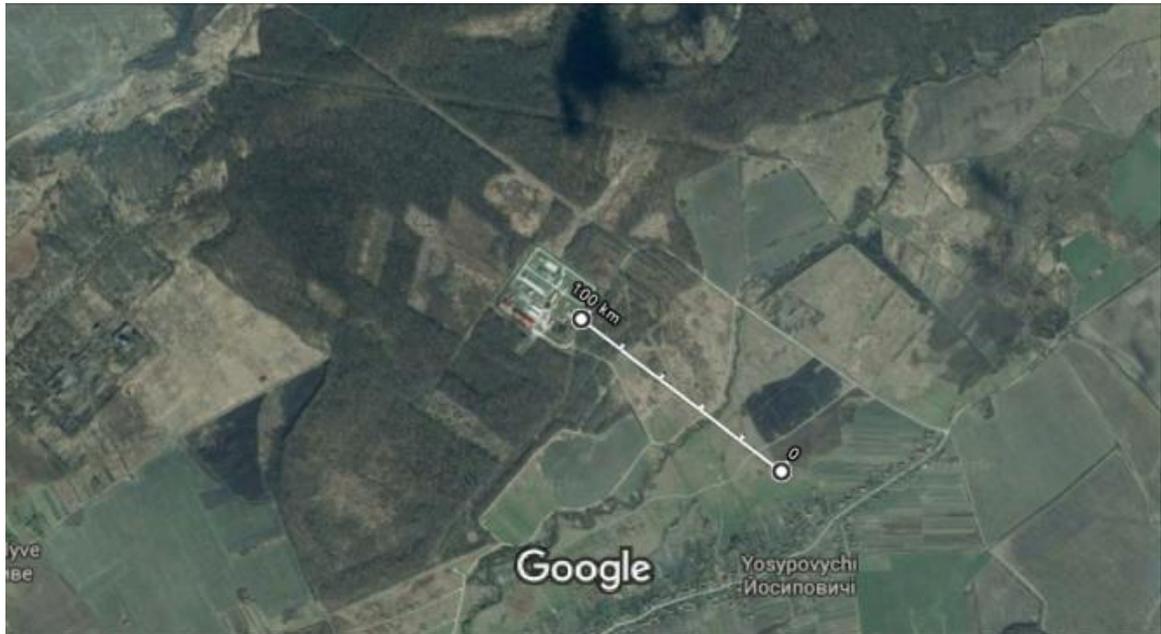


Figure 4-3 Oparske Gas Storage Facility (near Dovhe and Letnya villages, Lviv Oblast)



Figure 4-4 Uherske Gas Storage Facility (near Uhers'ko and Pukenychi villages, Lviv Oblast)

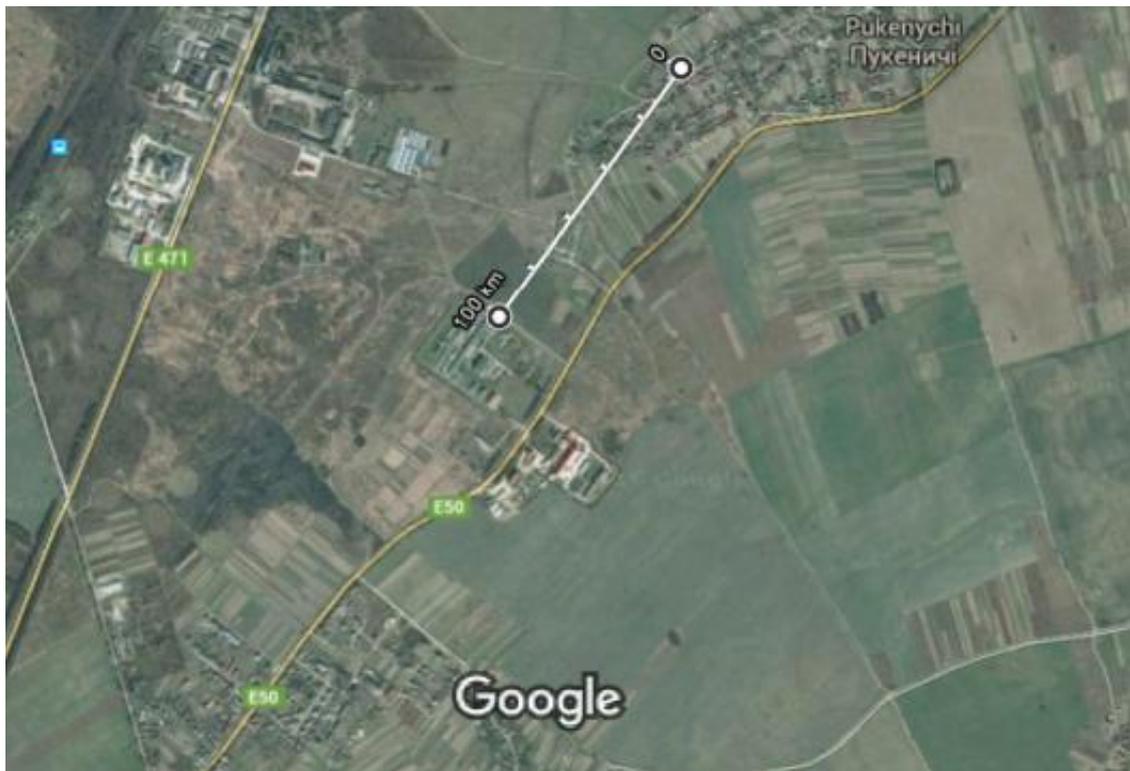
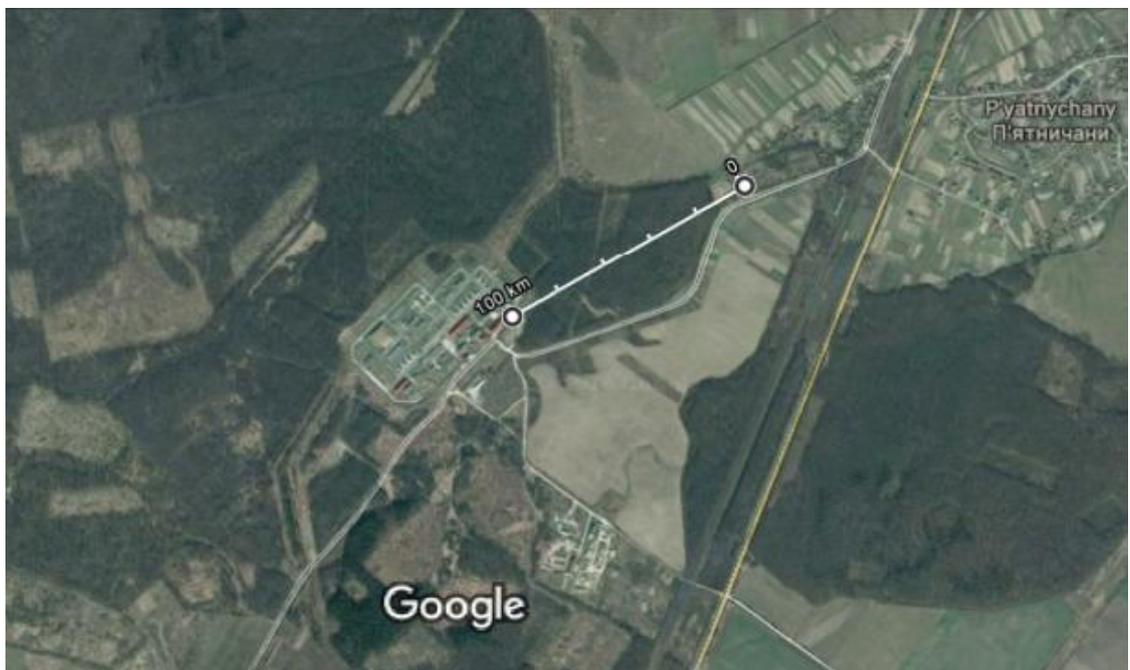


Figure 4-5 Bilche-Volytsko-Uherske Gas Storage Facility (near P'Yatnychany village, Lviv Oblast)



## 4.2 LAND OWNERSHIP

### LAND ACQUISITION AND ASSOCIATED RESETTLEMENT

Within the last five years, Naftogaz has only undertaken one development involving the acquisition, or the temporary occupancy, of land, for the Branch Metrological Centre development, totalling 0.39ha, in 2011. The state provided the right of permanent use of the land, described as obtained by the decision of the village council of Belogorodskaya. No further details of the process were available for this report.

Ukrtransgaz reports that the organisation has not undertaken expansion or development that has involved the acquisition, or the temporary occupancy, of land within the last 5 years. This includes the modernisation activities at Oparske.

At the gas storage sites, the company has a State license for operation, which includes permission for constant use of land. The local community are able to use the lands outside the site fence with certain limits, for example, you are not allowed to perform any civil construction in the sanitary protection zone and the 0.2 to 0.4 ha around each wellhead cannot be used by the public. The offsite pipelines can also mean certain limitations in nearby land use. Agriculture generally is allowed. Neither Naftogaz nor Ukrtransgaz have a defined policy or procedure for providing compensation to people who are physically displaced and/or lose their incomes or livelihood (permanently or temporarily) due to planned investments. Both organisations emphasised they simply follow national regulatory requirements in this regard.

Each year the company meets with the council of the local villages to describe the planned works in the area.

## 4.3 SITE GROUND CONDITIONS

### HISTORICAL LAND USE

Each of the gas storage facilities was previously a gas extraction site and buildings and equipment are therefore constructed on top of the reservoir formation.

The Oparske facility started gas production in 1979, with new buildings and equipment added over time. The eastern half of the site was described as being completely new (constructed in 2007) and reconstruction works are still ongoing.

The Uherske facility was originally constructed in 1975, with no significant changes to layout since that time.

The Dashavske facility started gas production in 1924, with conversion to storage in 1964 making it the oldest facility in Ukraine, with new buildings and equipment added over time.

The Bogorodchany site was developed in 1967 and expanded to include gas storage in 1979.

The Bilche-Volytsko-Uherske facility was constructed in 1985-92 in 3 stages. Since 1992, significant alterations have occurred, including installation of 3 stage pumping (different pressures), a pigging unit and new gas drying units.

### HYDROGEOLOGY AND GEOCHEMISTRY

A report detailing the geological, geotechnical, hydrogeological and geochemical profile of the project site is not available. No contaminated land site investigations are known to have been conducted at any of the sites, and there is no known regulatory driver for these at present.

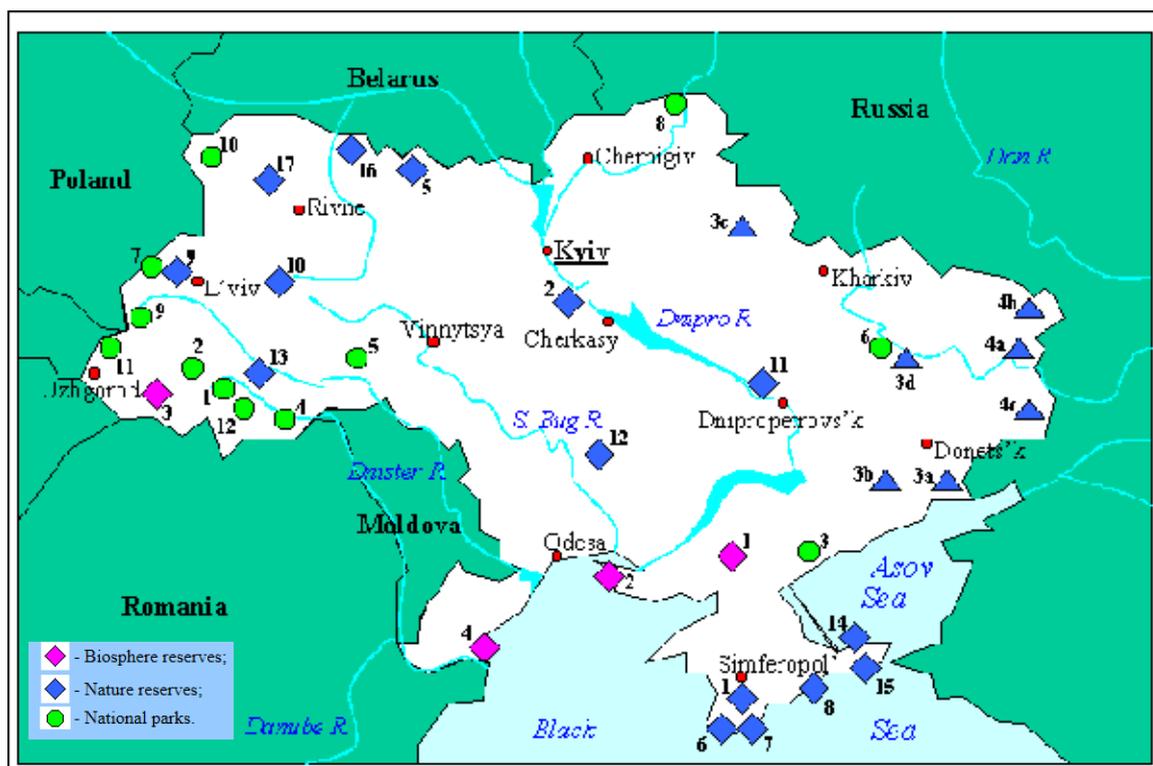
No areas of particular concern with respect to soil and/or groundwater contamination were noted during the site inspections and management reported that no significant spills or other releases have occurred. However, given the age of the facilities, the nature of the activities and the condition of some fuel and chemical storages, there is a high potential for some level of soil and/or groundwater contamination to be present in parts of all the sites even whilst regulatory compliance (of the time) was maintained.

## 4.4 NATURAL ENVIRONMENT

In Ukraine, protected areas and objects are designated as a Nature Preservation Fund site, and include national parks, nature reserves, biosphere reserves and other areas. The Ministry of Ecology and Natural Resources in Ukraine is responsible for the organisation, protection and use of the Nature Preservation Fund.

A review of online data sources identified 12 national parks, four biosphere reserves, 17 nature reserves and numerous dendrological parks designated in Ukraine. Figure 4-6 shows the indicative locations of national parks, nature reserves and biosphere reserves in Ukraine.

Figure 4-6 Sensitive Receptor Locations



Source: [Nature reserves \(zapovedniki\) in Ukraine, forests, environment](#). (Updated 12/02/2016)

In Ukraine there are no designated Emerald sites, although 159 areas were nominated in December 2014 occupying about 7% of the national territory.

Ukraine has 33 Ramsar sites designed as Wetlands of International importance, none of which are within the vicinity of the UGSFs.

Table 4-2 shows the location of the nearest protected or sensitive areas to the project sites for the UGSFs, based on Google imagery.

Table 4-1 UGSF nearby sensitive habitats

UGSF	HABITATS
Bilche-Volytsko-Uherske	No protected areas in the vicinity of the site. The nearest environmentally sensitive receptors appear to be several small watercourses or water bodies within 100-200m of the site.
Bogorodchany	No protected areas in the vicinity of the site. The nearest environmentally sensitive receptor appears to be a watercourse running parallel to the southern boundary of the site.
Dashavske	No protected areas in the vicinity of the site. The nearest environmentally sensitive receptor appears to be the Berezhnytsya River, located 500-600m from the site.

UGSF	HABITATS
Oparske	No protected areas in the vicinity of the site. The nearest environmentally sensitive receptor appears to be a watercourse within 100m of the SE corner of the site.
Uherske	No protected areas in the vicinity of the site. The nearest environmentally sensitive receptor appears to be a small waterbody within 100m of the north of the site.

Both Naftogaz and Ukrtransgaz report that none of their facilities have impacted upon any protected or designated areas or areas important for local biodiversity. Documentation to show the assessment undertaken to make this determination was not provided and it was noted at the meetings in Kiev that at least one of the gas transportation pipelines (beyond the scope of this assessment), traverses through a national park.

## 4.5 BUILT ENVIRONMENT AND CULTURAL HERITAGE

### BUILT ENVIRONMENT

Oparske: The site is predominantly surrounded by agricultural land. There is a gas production facility to the southeast of the site, operated by another party. The nearest off-site buildings are approximately 300 m to the south-east and appear industrial in nature, with another small single building, possibly for residential use, approximately 600 m to the south-west.

Uherske: Associated offsite locations include well heads (total 120 wells, with 88 operational) and gas lines feeding to the site. The nearest residence is 528 m to the north-east in Pukenychi.

Dashavske: The site is immediately surrounded by forest with agricultural land evident beyond that. Associated offsite locations include well heads and gas lines feeding to the site. The nearest residence is greater than 1 km from the site.

Bogorodchany: The nearest residence, part of the village of Sadzhava is approximately 600 to 700 m north-west of the site. There is also a small single building of unknown use approximately 400 m to the east of the site.

Bilche-Volytsko-Uherske: There is a collection of buildings, appearing industrial in nature approximately 700 m to the south-east and sharing an access road to the site. The nearest known residence is greater than 1 km from the site.

### CULTURAL HERITAGE

Naftogaz reports that none of the development of the organisation's facilities involved significant excavations, demolitions, movement of earth, flooding or other changes in the physical environment and that none of its facilities are located in, or in the vicinity of, a nationally recognised cultural heritage site. No specific documentation has been provided in this regard.

Ukrtransgaz also reported that none of the development of the organisation's facilities involved significant excavations, demolitions, movement of earth, flooding or other changes in the physical environment, though this would seem unlikely to apply to all facilities given their nature. Ukrtransgaz does report that part of the pipeline infrastructure (which is beyond the scope of this due diligence) is located in, or in the vicinity of, a nationally recognised cultural heritage site and that the pipeline route was in fact realigned to avoid the site (a burial mound). For trenching for the overhaul of one of the main pipelines, Ukrtransgaz noted they did have the obligation to stop work during excavation upon chance finds of suspected cultural heritage materials and to contact the relevant authority (Centre for protection and study of archaeological sites).

Ukrtransgaz also described that when any new land is needed for company activities, land allotment documents include a check for any likely interaction with cultural heritage. This check is performed by State bodies and is a mandatory component of the process.

**ESAP item 1.2 has been defined to include that procedures for systemic cultural impact assessment and management of chance cultural heritage finds should be developed. Risk Rating: Medium (overall rating for the action)**

# 5 ENVIRONMENTAL, HEALTH, SAFETY AND SOCIAL MANAGEMENT ARRANGEMENTS

## 5.1 EHSS RESPONSIBILITIES

Key management roles are described below.

### NAFTOGAZ

Naftogaz has a:

- **Head of Labour Protection and Ecology**, responsible for Environmental Management at the organisation;
- **Director of the Department of Personnel Management and the Social Sphere**, responsible for Human Resources and Health & Safety Management at the organisation;
- **Director of Energy Saving and Logistics**, responsible for Procurement/Supply Chain Management at the organisation; and
- **Head of Public Relations**, responsible for Communication (including stakeholder engagement) at the organisation.
- **Director of Economic, Industrial, Information Security & Risk Management** and Department. In particular, the Department shares its functions with the subsidiaries and companies including the public joint-stock companies in line with the corporate governance in terms of technical supervision and occupational safety (operation of extra-hazardous facilities, buildings, structures, plant and equipment), emergencies (man-made and natural emergencies – breakdowns, failures analysis) and application of tools and means of civil defence in case of emergency (including response to emergency by the community and environmental impact). A Commission for Emergencies has been created in the Company and the Director of the Department has been appointed as the Head of Field Work Headquarters, which is an operating body of the Commission for Emergencies.

The number of permanent Naftogaz staff assigned to management and operation of functions is described by Naftogaz as follows:

- Environment            3
- Health & safety        4
- Human resources    18
- Communications      7

Naftogaz also assigns environmental and social responsibilities at the subsidiary / regional level. This includes developing Model Regulations that are recommended for use. The powers of the branches and other separate units in the field of environmental and social policies are determined by the Regulations on these units. The head of branches and certain other officials are responsible for the implementation of these policies.

The functions of occupational, fire safety, emergencies and civil defence and health and safety are split between different subdivisions. In particular, within the structure of Economic, Industrial,

Information Security & Risk Management Department there function subdivisions of Occupational Safety Division (Technical Supervision and Occupational Safety Section, Civil Defence and Emergency Section), Guarding Measures Execution Control Division (Guarding Measures Organisation and Control Section, Security Procedures Section), which operations are regulated with the respective legislative instruments. Instead, Health & Safety and environmental safety are under responsibility of Health & Safety and Environment Division.

Naftogaz reported that all administrative documents, events, programs, activities, procedures for change in the environmental field and Occupational Safety and Health (OSH) are sent to all employees of the Company in paper and electronic format, as well as posted on the Company website and also by newsletters. In addition, the Company's internal portal has a database of standards, including for environmental and labour protection. This portal is accessible by all company employees e.g. Ukrtransgaz and regional employees also.

Naftogaz reported undertaking employee training on environment and health and safety, but not on human resources management.

Experts within the environmental, health and safety team reportedly undergo periodic training according to their professional development plan. In 2015 that kind of training was carried out in Ivano-Frankivsk National University of Oil and Gas. In February 2016, experts of the Environmental Department underwent training in the Academy of Occupational Health and Safety Management Systems on the following programs: "Research and implementation of management systems based on risk management", "Audit and certification of management system", "Methods and risk management tool in management systems", in the area of Environmental Safety and received certificates of internal auditors of management systems. As a part of Company's' employees professional development program, in 2016 it is planned to carry out training for the experts of the Environmental Department at the State Environmental Academy in the area "Environmental audit of the Company". Furthermore, the experts of the Environmental Department arrange and frequently take part in conferences, workshops, meetings in various areas of environmental activity carried out by the Ministry of Ecology and Natural Resources, State and private-owned environmental organizations.

Naftogaz does not generally rely on external experts for environmental and social issues; it has its own specialists.

## UKRTRANSGAZ

There is a designated member of the Ukrtransgaz Board who has responsibility for EHSS. The following positions are also designated within the organisation:

- [Head of the Use of Energy Resources and Ecology](#), responsible for Environmental Management at the organisation;
- [Chief of Staff](#), responsible for Human Resources Management at the organisation;
- [Management of Labour Protection, Technical Surveillance and Fire Safety](#), responsible for Health & Safety Management at the organisation;
- [Head of Procurement of Goods, Works and Services](#), responsible for Procurement / Supply Chain Management at the organisation; and
- [Head of Public Relations and Press](#), responsible for Communication (including stakeholder engagement) at the organisation.

The number of permanent Ukrtransgaz staff assigned to EHSS management and operation functions is reported as follows:

- Environment 5
- Health & safety 7
- Human resources 7
- Communications 4

Ukrtransgaz does not generally rely on external experts for environmental and social issues; it has its own specialists.

Ukrtransgaz also assigns environmental and social responsibilities at the subsidiary / regional level. This is done through development of orders to the operating units, preparation of relevant administrative documents, briefings, training, etc. This supplements the company-wide updates provided by Naftogaz.

Ukrtransgaz reported undertaking routine employee training on environment and health and safety, but not on human resources. The training plan for the management team and an example record of training was not available for review.

## REGIONAL

At Ukrtransgaz subsidiary Lvivtransgaz, which manages operations in Lviv Oblast, there is a Chief Engineer and Deputy Chief Engineer working across all operations. The Chief Engineer is responsible for Health & Safety and there is also a central, regional, group of environmental personnel who provide technical assistance.

At Ukrtransgaz subsidiary Prykarpattransgaz, which manages operations in Ivano-Frankivsk Oblast, there is a Deputy Chief Engineer and Director of Safety working across the operations. There is also a central, regional, group of environmental personnel who provide technical assistance to the sites.

Each of the sites has a dedicated Chief Engineer with overall responsibility for all permits, licenses and overall for environmental, safety and social management. Each site also has a technical support team consisting of an ecologist who covers environmental and two safety specialists (one for occupational safety and the other fire protection).

## 5.2 EHSS MANAGEMENT SYSTEMS

Management systems and general arrangements are outlined below, with specific issues being described later in this report.

### EHSS MANAGEMENT SYSTEMS OVERVIEW

Naftogaz has an integrated management system (IMS) incorporating quality, environment and H&S. None of the elements of the system are currently certified. Naftogaz stated that the management system components for H&S and Social Accountability are compliant with OHSAS18001 and SA8000 respectively. Environmental (e.g. ISO14001) and Quality (e.g. ISO9001) systems are in development, with plans for certification of the quality management system. Naftogaz currently has no plans for ISO50001 (Energy) or AA1000 (Corporate Responsibility) components of the system.

Naftogaz reported that they plan to develop a new regulatory document on OSH management at the Company, subject to the provisions of the national standard of Ukraine DUST OHSAS 18001: 2010 "Management System Occupational Health and Safety Requirements" (OHSAS 18001: 2007, IDT), and international best practices for managing occupational safety and health ("Seven Golden Rules", "Zero Accident - Zero Injuries at Work"). This will replace the industry standard SDAs 74.1-20077720-025: 2006 "OSH Management System Naftogaz of Ukraine".

Safety management systems are centralised and are based on the OHSAS 18001 Standard and Ukrainian legal Safety Codes which then inform the specific safety controls that need to be implemented on site. However, in relation to some risk areas, there are additional competence based management controls in place. For instance, only electricians who are certified by the State Authorities are permitted to work on live electrical equipment and electrical systems and equipment for use in potentially explosive atmospheres.

Human resources (HR) procedures were reported to be in line with International Labour Organisation conventions.

Ukrtransgaz also has an integrated management system incorporating quality, environment and H&S and incorporating all regional activities such as those of Lvivtransgaz. The system is certified

to OHSAS18001 (Health and Safety), ISO14001 (Environment), ISO50001 (Energy), and ISO9001 (Quality). Ukrtransgaz currently has no plans for specific Social Accountability (e.g., SA8000) or AA1000 (Corporate Responsibility) components of the system.

### **CORPORATE EHSS CERTIFICATES**

The following management system certificates and related correspondence was reviewed:

- Confirmation Letter, Cooperation partner of TUV SUD, No 928/01-16 dated 04.01.2016, on successful passing of the certification audit for verification of compliance with the requirements of ISO 9001, ISO14001, OHSAS 18001, ISO 50001
  - Scope: Transportation and storage of natural gas
- ISO 9001:2008, Certificate number 01 100 115814, issued by TUF Rheinland Cert GbbH on 08.08. 2013, validity dates: 2012.06.05 – 2015.06-04, audit report number 115814
  - Scope of the certification: Transportation and storage of natural gas
- ISO 14001:2004, Certificate number 01 104 1157814 issued by TUF Rheinland Cert GbbH on 08.08. 2013, validity dates: 2012.06.05 – 2015.06-04, audit report number 115814
  - Scope of the certification: Transportation and storage of natural gas
- BS OHSAS 18001:2007 Certificate number 01 113 115814, issued by TUF Rheinland Cert GbbH on 08.08. 2013, validity dates: 2012.06.05 – 2015.06-04, audit report number 115814
  - Scope of the certification: Transportation and storage of natural gas
- ISO 50001:2011, Certificate Registration No 12 340 47135 TMS, issued by the Certification Body of TUF SUD Management Services GmbH on 2014.01.15, validity dates: 2014.10.25 – 2017.01.14, audit report No 707020705
  - Scope of certification: establishment and application of Energy Management System for Transportation and storage of natural gas

The certifications for ISO9001, ISO14001 and OHSAS18001 extend to the site level and the policies were also noticed on display at several of the sites.

### **LEGAL REQUIREMENTS IDENTIFICATION**

Both Naftogaz and Ukrtransgaz reported that they maintain a register of application legislation and the Ukrtransgaz register was provided for review. The list of the applicable legislation and standards, including the references to the latest amendments, has the following sections:

- 1.1. Codes
- 1.2. Laws
- 1.3. Documents of the President of Ukraine
- 1.4. Documents of the Cabinet of Ministers of Ukraine (Decrees, Decisions, Orders)
- 1.5. Documents of the central government authorities (Ministry of Energy, Ministry of Social Policy, Ministry of Ecology and Natural Resources, Ministry of Regional Development and Housing, Ministry of Emergency, Ministry of Economic Development and Trade, Ministry of Justice, State Agency of Energy Efficiency and Energy Saving, State Service of Mines Inspectorate and Industrial Services)
- 1.6. Decisions of the National Commission on regulation of the power sector
- 1.7. Technical Regulations

The list is not site specific and no site-specific versions are developed.

Ukrtransgaz reported that in addition to national legislation they analyse good practices of other companies and EU requirements with subsequent application in the enterprise as applicable.

**ESAP item 1.1 has been defined to cover that Naftogaz should continue to develop its integrated EHSS management system to achieve compliance with requirements of IFC Performance Standards. Risk Rating: Low**

**ESAP item 2.1 has been defined to cover that Naftogaz should an Occupational Health & Safety Management system consistent with a recognised international standard. Risk Rating: Low**

## PLANS AND PROCEDURES

Naftogaz has a variety of procedures and plans in place (procedures and standards were described as numbering in the thousands) with these are managed through an online database (sharepoint format) accessible by all staff. This database was demonstrated during the site visit to Naftogaz headquarters. A specific manual combining pertinent items for EHS did not appear to be available yet, which is consistent with Naftogaz noting their IMS system is still under development.

Ukrtransgaz also uses the online database and has a number of manuals, which were reviewed for this report. The manuals include:

- COY 60.3-3001 9801 - 093:20 I 5 - Management system of quality, environment and occupational safety. [Procedure manual for the integrated management system of PJSC "Ukrtransgaz"](#).
- COY 60.3-300 I 980 I - 0 1 4:2004 – Quality management and elements of the quality system. [Manual for application of a process approach in the integrated quality and environment management system of PJSC "Ukrtransgaz"](#).
- COY 49.5-3001980 I - 108:201 3 – Management systems of quality, environment and occupational safety. [Provisions for the Document Centre of PJSC "Ukrtransgaz"](#).
- COY 49.5-300 I 9801 - 1 I 0:201 3 – 3 Management system of quality, environment and occupational safety. [Arrangement and implementation of internal audit](#).
- Policies / procedures of the integrated management system of Ukrtransgaz (ISO 9001, ISO 14001, OHSAS 18001, ISO 5001) include:
  - MYTF 01:2013 Management systems of quality, environment and occupational safety. [Documentation management](#).
  - MYTF 02:2013. Management systems of quality, environment and occupational safety. [Protocol management](#).
  - MYTF 03:2013. Management systems of quality, environment and occupational safety. [Monitoring of processes](#).
  - MYTF 04:2013. Management systems of quality, environment and occupational safety. [Deviation management, corrective and preventive actions](#).
  - MYTF 05:2013. Management systems of occupational safety. [Determination of hazards and risk evaluation](#).
  - MYTF 05:2013 Environment management system. [Determination of environmental aspects and their evaluation](#).
  - Provisions for [training of internal auditors](#) of Ukrtransgaz (approved by order of PJSC "Ukrtransgaz" No 51 of 14.02.2008).

At the site level, a full copy of the procedure manual was provided for Dashavske, along with front pages and tables of contents for the remaining four gas storage sites. The tables of contents are similar and the manual has the following content:

- Introduction
- Scope of applicability
  - General provisions
  - Processes of integrated management system
  - Justification of reserves
- Normative references
- Definitions, markings and abbreviations
- Quality management system
  - General requirements
  - Requirements re documentation
- Responsibilities of management
  - Obligations of management
  - Customer orientation
  - Policy in quality
  - Planning
  - Responsibilities, authorities and informing
  - Analysis by management
- Resources management
  - Provision of resources
  - Human resources
  - Infrastructure
  - Operating environment
- Management and provision of services on gas storage
  - Service planning
  - Processes related to the customers
  - Design and development
  - Procurement
  - Production and provision of services
  - Management of monitoring means and measurement technique
- Measurement, analysis and improvement
  - General provisions
  - Monitoring and measurement
  - Nonconformity management
  - Data analysis
  - Improvement
- Ecology management
  - General provisions
  - Ecological policy
  - Introduction and functioning
  - Checks
  - Analysis by management
- Occupational safety management
  - General provisions
  - Occupational safety policy
  - Planning
  - Introduction and functioning
  - Checks
  - Analysis by management

- Annex A Organisational structure
- Annex B Process interaction chart of the integrated management system
- Annex C Description of processes of the integrated management system
- Annex D A list of effective enterprise standards by activity areas which are used in Dashava division of underground gas storages

Naftogaz has an existing action plan covering environmental management, health and safety management, and human resources management. The environmental action plan 2015-2020 was available for this review. Topics include:

- Raising of ecological awareness;
- Improvement of the ecological situation and improvement of the level of ecological safety (protection of atmosphere, water resources, lands and soils, waste management and management of hazardous substances);
- Implementation of integrated ecological management; and
- Development of norms and legislative provision on ecological activity.

Naftogaz also noted the actions they are committed to in response to the 2015 ESAP from EBRD, related to that separate due diligence exercise, and have provided a copy of that ESAP as part of this review.

Ukrtransgaz reported they have an existing, budgeted, action plan covering environmental, health and safety, human resources, and communications management. However, it was not provided for review. Ukrtransgaz is also aware of the requirements described in the 2014 and 2015 ESAPs from EBRD, related to the two separate EBRD due diligences.

During site visits it was described that changes such as new equipment or plans are initiated at the corporate level by Ukrtransgaz as is budget allocation.

Actions plans are available at the site level and include:

- Oparske: Lists 28 measures including air protection by improving of operation of different machines; land, soil, flora and fauna protection by improvement of waste management; re-cultivation of soil; improving of reporting; and recording of metering etc.
- Bilche-Volytsko-Uherske and Dashavske: Lists 49 measures including: organisational actions by functioning of the ISO14001 quality system; air protection by different technical measures to prevent leakages and improvement of equipment maintenance; water resources management by maintenance and repair works; land protection by re-cultivation of land, elimination of leakages, collection of spills, cleaning of pipes and equipment; and inventory and certification of wastes.
- Bogorodchany: 15 pages of measures, including a combination of technical and organisational measures including repair works, maintenance etc.

## **EHSS INSPECTION AND AUDIT PROGRAMME**

It was reported that Naftogaz has an annual audit programme and audits take place before autumn and winter. Documents are prepared by Ukrtransgaz and other subsidiaries. Technical, operation, H&S and security procedures are reviewed and inspected. Ukrtransgaz issues a site passport / certificate, as a means of self-certification, for readiness for the site and is available at each site. Regulatory bodies check compliance and also carry out inspections. Naftogaz checks the Ukrtransgaz standards are acceptable as well as the regulatory bodies checking these. Health and safety regulation includes actions, forms of report (monthly, quarterly, annually), department inspection control, risks identified, checklist for inspections, safety plan and daily checks for each site, and risk identification. An example of a recent (2015) corporate audit report was described to us as covering topics such as environment, health and safety; however, a copy was not available for review. Copies of example audit reports at the site level were available.

Reportedly, there is a system in place to undertake at least daily safety inspections at each location by operators following a pre-defined route and checklist; items such as general conditions of equipment and workplace, measurement of explosive gas levels are recorded.

Weekly inspections by the area line manager and quarterly audits by a team led by the site Chief Engineer are also conducted, following which a formal report is issued.

### 5.3 ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

Naftogaz has not made a specific assessment of the environmental and social impacts of its overall operations, but does report that environmental impact assessment is carried out in accordance with the applicable national legislation for specific projects. This includes an EIA for the construction of the stage II Metrological Centre in Boyarka ("The Eastern Regional Center of metrology of natural gas, oil and petroleum products"). Construction of the center will enable the commissioning of laboratories in order to implement and monitor compliance with the requirements of harmonized European and international standards.

Ukrtransgaz also reports to perform assessments in accordance with national legislation. Ukrtransgaz directly lead on the early stages of development of a new project. This was confirmed on site where staff frequently referred to plans for new developments or equipment originating at the Ukrtransgaz level.

EIA documents were requested as part of this review; however, an example was not provided. Additional EIA documentation might become available to OPIC during the course of their project review. The national environmental impact assessment (OVNS) for the recent Ukrtransgaz Emergency Pipeline Upgrade and Modernization project was found online. The content of the document includes:

- Physical and geographical baseline of the region;
- General characteristics of the project;
- Environmental impact assessment of the planned activities (climate, air, geology, water, soils, flora and fauna);
- Impact assessment of the planned activities on the anthropogenic environment;
- Mitigation measures; and,
- Attachments included: Articles in the newspapers – announcement of public hearings; Calculation of waste production during construction; and, Information on land recultivation.

### 5.4 ACQUISITIONS / DIVESTMENTS

Naftogaz does not have formalised environmental and social due diligence (investment appraisal) procedures for new acquisitions and / or projects or undertake environmental and social evaluation and remediation in relation to divestments.

Ukrtransgaz does reportedly have formalised environmental and social due diligence (investment appraisal) procedures for new acquisitions and / or projects, which includes considering the EIA materials produced for new projects. Like Naftogaz, they do not have procedures for environmental and social evaluation and remediation in relation to divestments.

**ESAP item 1.2 has been defined to cover that standards and procedures on impact assessment, including land acquisition, community impacts, and cultural heritage, in line with IFC PS1 should be developed. Risk Rating: Medium**

# 6

## SITE ENVIRONMENTAL PERFORMANCE

### 6.1

#### PERMIT COMPLIANCE OVERVIEW

Both Naftogaz and Ukrtransgaz report that they have the required environmental permits and licences to operate. The permits identified are described below.

##### Air Emissions

- **Oparske** - Permit No 4621285701-1 of 12.08.14 for emissions of pollutants to air from the stationary sources, validity period 10 years from 12.08.2014 to 12.08.2024, decision of State sanitary service in Lviv Oblast N0 2791/08-06/01/61 of 01.08.2014. This permit sets emission limits for the main emission sources (including 7 gas compressor units) and other sources

Main stationary emission sources

- Carbon dioxide (CO<sub>2</sub>). Emission limit is not defined by legislation because the mass flow is below 5,000 g/hour.
- Nitrous Oxide (NO<sub>x</sub>). Maximum allowed emissions by legislation is 500 mg/m<sup>3</sup>. Allowable emission level is 1,500-1,800 mg/m<sup>3</sup> till 01.01.2019 and 500 mg/m<sup>3</sup> after this date.

The other sources group includes methane and other emission sources (all emission sources, more than 300). Emission limits for CO<sub>2</sub>, NO<sub>x</sub> and methane are set forth there

- CO<sub>2</sub>. Maximum allowed emissions by legislation are 250 mg/m<sup>3</sup>. Allowable emission level is 250 mg/m<sup>3</sup> since 06.03.2015.
- NO<sub>x</sub>. Maximum allowed emissions by legislation are 500 mg/m<sup>3</sup>. Allowable emission level is 500 mg/m<sup>3</sup> since 06.03.2015.
- Methane emission level is different for each source.

The permit requires monitoring of NO<sub>x</sub> emissions from gas compressor units (emission sources 101-107) annually till 2025 and monitoring of CO<sub>2</sub> and NO<sub>x</sub> for emission sources 2001-2004.

- **Dashavske** – Amendment to Permit No 4625355300-2a of 08.01.2013 for emissions of pollutants to air from stationary sources, validity period 10 years from 08.01.2013 to 08.01.2023, decision of State sanitary service in Lviv Oblast N0 05.03.02-07/66574 of 16.10.2008.

No emission limits are set for the main stationary sources, only for the other sources.

For other sources (148 points) emission limits are set for CO<sub>2</sub>, NO<sub>x</sub> & methane.

The permit requires annual monitoring of CO<sub>2</sub> and NO<sub>x</sub> from sources 5-10 and suspended particulates from sources 4, 87, 113.

- **Uherske** – Permit No 4625388401-5 of 06.03.2015 for emissions of pollutants to air from stationary sources, validity 10 years from 06.03.15 to 06.03.2025, decision of State sanitary service in Lviv Oblast N0 370/08-02/289 of 12.02.2015. This permit sets emission limits for the main stationary sources (7 gas compressor units) and other sources.

For the main stationary emission sources the main emissions are CO<sub>2</sub> and NO<sub>x</sub>.

- CO<sub>2</sub>. Maximum allowed emissions by legislation is 250 mg/m<sup>3</sup>. Allowable emission level 580-590 mg/m<sup>3</sup> till 01.01.2025 and 250 mg/m<sup>3</sup> after this date.
- NO<sub>x</sub>. Emission limit is not defined by legislation because the mass flow is below 5000 g/hour. Limits are set forth in compliance with Order of Ministry of Environment No 309 of 27.06.2006 and they are in the range 1.18 – 1.37 g/sec.

For other emission sources (including gas compression units and methane emission sources – total approximately 100 sources), emission limits are set for CO<sub>2</sub>, NO<sub>x</sub> and methane.

The permit requires annual monitoring of CO<sub>2</sub> and NO<sub>x</sub> emissions for the main stationary emission sources and suspended particulates for source 105.

- **Bogorodchany** - Permit No 2620455100-12 of 08.01.14 for emissions of pollutants to air from stationary sources, validity period 10 years from 08.01.2014 to 08.01.2024, decision of State sanitary service in Ivano-Frankivsk Oblast NO 05.03.02-07/83884 of 17.09.2013. This permit sets emission limits for the main emission sources and for other sources.

The main stationary emission sources include 10 gas compressor units.

- CO<sub>2</sub>. Maximum allowed emissions by legislation is 250 mg/m<sup>3</sup>. Allowable emission level is in the range 450-621 mg/m<sup>3</sup> till 01.01.2018 and 200 mg/m<sup>3</sup> after this date.
- NO<sub>x</sub>. Maximum allowed emissions by legislation is 500 mg/m<sup>3</sup>. Allowable emission level is 1200 - 1800 mg/m<sup>3</sup> till 01.01.2016-2017 and 450 mg/m<sup>3</sup> after these dates.

For other emission sources (more than 300 points), emission limits are set for CO<sub>2</sub>, NO<sub>x</sub> and methane.

The permit requires annual monitoring of CO<sub>2</sub> and NO<sub>x</sub> from sources 58-67.

- **Bilche-Volytsko-Uherske** - Permit No 4625385801-1 of 06.03.2015 for emissions of pollutants to air from stationary sources, validity period 10 years from 06.03.15 to 06.03.2025, decision of State sanitary service in Lviv Oblast NO 386/08-02/292 of 13.02.2015.

No emission limits are set for the main stationary sources, only for the other sources.

For other sources (more than 300 points) emission limits are set for CO<sub>2</sub>, NO<sub>x</sub> and methane.

- CO<sub>2</sub>. Maximum allowed emissions by legislation are 250 mg/m<sup>3</sup>. Allowable emission level is 250 mg/m<sup>3</sup> since 06.03.2015.
- NO<sub>x</sub>. Maximum allowed emissions by legislation are 500 mg/m<sup>3</sup>. Allowable emission level is 500 mg/m<sup>3</sup> since 06.03.2015.
- Methane emission level is different for each source.

The permit requires annual monitoring of CO<sub>2</sub> and NO<sub>x</sub> from gas compressor units annually until 2025 and monitoring of suspended particles from sources 30 and 68.

### Water Permits

- **Oparske** – Permit sighted during site inspection but only partial copy provided for detailed review.
- **Dashavske** – Permit for special water use.
  - Water intake from three water wells.
  - Water discharge to sewerage system of Dashava town.
- **Uherske & Bilche-Volytsko-Uherske** – Permits sighted during site inspection but no copies provided for detailed review. Some are combined permits, covering both facilities.
- **Bogorodchany** – Permit for special water use No Укр-541-A-Ів, validity period 06.05/2015 – 30.01.2018.
  - Water intake from artesian well.
  - Water discharge to sewerage system of Bogorodchany town.

### Waste Permits

No current permits were identified and WSP|PB understands that this is appropriate, and that waste reporting only is required.

### Permit Compliance

Naftogaz has received 16 inspections from environmental authorities in the past five years, the most recent in July 2015. Ukrtransgaz has received 40 in the same period of time, with the most recent also in July 2015. These have resulted in 300,000 Ukrainian Hryvnia (UAH) of fines (in the order of 11-12,000 USD) for Ukrtransgaz. These fines and associated proceedings by the State

Environmental Inspectorate were reported to focus on the late receipt of permits (including those associated with changes in legislation) and the excess emissions resulting from gas pipelines (offsite and not in the scope of this assessment). No operations have been suspended or closed down due to environmental reasons and all are currently reported to be operating in compliance with permits.

No notices of non-compliance have been received from authorities in the last 5 years. However, some opportunities for improvement have been communicated by the regulators following inspections.

In accordance with the Law of Ukraine of 25.06.1991 № 1264-XII on Environmental Protection, Company subsidiaries report information up to Naftogaz for compilation of statistical reports for submission to regulators. These cover air emissions (annual), water management (annual), waste (annual), and environmental costs (annual). Ukrtransgaz noted reporting from its subsidiaries and up to Naftogaz on various topics as frequently as monthly.

The Company reported that it records all serious environmental incidents or accidents and conducts associated investigations.

There have been environmental incidents in the past three years. However, these are related to unauthorised tapping of product pipelines, leading to the loss of oil and oil products, petrochemical pollution, and damage to the gas pipeline. However, these operations are not within the scope of this report.

Significant incidents are required to be reported to relevant authorities in accordance with national legislation. Depending on the nature of the incident, these relevant authorities include:

- Territorial division of the State Statistics Service of Ukraine.
- Territorial division of the State Ecological Inspectorate.
- Department of Environment regional state administrations.

As for H&S incidents, minor incidents and near misses are not recorded at the local or Corporate level and it would appear that staff are administratively and financially penalised for reporting / having accidents, or not meeting EHS related performance requirements.

**ESAP item 4.3 has been defined to cover that the organisational culture is improved and accident / incident/ near miss reporting should be encouraged rather than penalised.**

## 6.2 APPLICABLE REGULATORY REQUIREMENTS AND STANDARDS

### UKRAINIAN LEGISLATION

Operation of the facilities is subject to Ukrainian environmental and planning regulations, as described in Section 3.5.

Naftogaz reported that they have not identified any areas of their operations where EU environmental requirements are more stringent than local requirements. In order to identify and track gaps with EU environmental requirements, representatives of the Company participate in public hearings on the draft updated Strategy Environmental Policy of Ukraine with respect to the European Union project. This includes the involvement of the Ministry of Ecology and Natural Resources of Ukraine. However, during meetings with Naftogaz they did note that much of the domestic equipment that is used does not meet EU requirements for BAT.

The organisation reported that it monitors compliance at its facilities and subsidiaries with relevant national environmental laws, EU regulations, organisational policies and standards. Subsidiaries of the Company periodically provide reports on indicators of environmental performance. Company specialists regularly take part in inspections with respect to compliance with legislation including:

- Law of Ukraine on "Environmental Protection" of 25.06.91 №1264-XII.
- Law of Ukraine on "Air Protection" of 16.10.92. №2707-XII.
- Law of Ukraine on "Land Protection" of 19.06.03 №962-IV.

- Law of Ukraine on "Waste" from 05.03.98 №187 / 98-BP.
- Subsoil Code of Ukraine from 27.07.94 №187 / 98-BP.
- Land Code of Ukraine from 25.10.01 №2768-III.
- Water Code of Ukraine from 06.06.95 №213 / 95-VR.

## IFC PERFORMANCE STANDARDS

Environmental performance of the facilities has been reviewed against the requirements of the IFC General EHS Guidelines and also the IFC Sector Guidance for Onshore Oil & Gas Development, which is considered the most applicable IFC Sector Guidance. Sections of the Guideline that are not relevant to the site operations have been omitted. The key requirements of the Onshore Oil & Gas Development Sector Guideline are summarised in the table below. The IFC Sector Guidance for Natural Gas Processing was also consulted, but largely duplicates the Onshore Oil & Gas Development Guideline. However, this guideline has been incorporated into the table below where it provides substantially different guidance.

In accordance with the provisions of EBRD Performance Standard 3, alternative pollution prevention and control technologies may be approved, provided that (1) the alternative performance levels are consistent with the overall requirements of Performance Standard 3; and (2) the alternative performance levels are protective of the environment and Project Affected People within the Area of Influence.

**Table 6-1 BAT Assessment for Naftogaz Facilities**

IFC BAT REQUIREMENT	COMPARISON	BAT
<b>Air Emissions – General</b>		
Annual quantification of significant (>100,000 tons CO <sub>2</sub> equivalent per year) greenhouse gas (GHG) emissions from all facilities and support activities in accordance with internationally recognized methodologies and reporting procedures	<p>CO<sub>2</sub> generation data provided by Naftogaz indicates that generation across the business exceeds the 100,000 ton threshold.</p> <p>Quantification of emissions has been conducted but it is not known if this has been done in accordance with internationally recognized methodologies and reporting procedures.</p>	<p>Quantification of emissions is BAT, but only if this has been done in accordance with internationally recognized methodologies and reporting procedures.</p> <p><b>ESAP item 3.1(b) has been defined to cover that it should be confirmed that internationally recognized methodologies and reporting procedures have been used for quantification of GHG emissions. Risk Rating: Low</b></p> <p>An assessment of direct greenhouse gas emissions is being provided under separate cover for submission to OPIC.</p>
Maximisation of energy efficiency and design facilities to minimise energy use to reduce air emissions and evaluate technically feasible cost-effective options for reducing emissions.	Most equipment is already operational, and much of it has been operational for considerable periods of time, so is unlikely to comply with all specifications of the guidelines.	<b>ESAP item 3.1(a) has been defined to cover that a review of air emissions against IFC and other international standards should be conducted. Risk Rating: Low</b>
Estimation of air quality impacts by the use of baseline air quality assessments and atmospheric dispersion models to establish	Baseline air assessments are not known to have been conducted. However, the maximum sanitary protection zone of 1km	Unknown. However, due to the distances used in the SPZ calculation

IFC BAT REQUIREMENT	COMPARISON	BAT
potential ground level ambient air concentrations during facility design and operations planning as described in the General EHS Guidelines. These studies should ensure that no adverse impacts to human health and the environment result	has been applied at 4 out of 5 facilities, with the other reduced to 500m based on government assessment and approval.	processes, air quality is unlikely to be a significant issue at the facilities.
<b>Air Emissions – Exhaust Gases</b>		
<p>Air emission specifications should be considered during all equipment selection and procurement.</p> <p>For air emissions, the following guidelines were applied:</p> <ul style="list-style-type: none"> <li>• NOx*: 320 mg/Nm<sup>3</sup> (boilers)</li> <li>• NOx*: 25 ppm /51.25 *** (Turbine 15- &lt;50MWth)</li> <li>• NOx*: 100 ppm (Mechanical drive turbine 3-15MWth) (205 mg/Nm<sup>3</sup> ***)</li> <li>• NOx*: 42 ppm (Electric generation turbine 3-15MWth) (86.1 mg/Nm<sup>3</sup> ***)</li> <li>• Dry Gas Excess O<sub>2</sub> Content*: 15% (turbine)</li> <li>• Dry Gas Excess O<sub>2</sub> Content*: 3% (boiler)</li> <li>• H<sub>2</sub>S**: 5 mg/Nm<sup>3</sup></li> </ul> <p>* limit taken from IFC General EHS Guidelines  ** limit taken from IFC Sector Guidance for Onshore Oil &amp; Gas Development  *** The General EHS Guideline gives these guideline values in parts per million (ppm). This has been converted to mg/Nm<sup>3</sup> using a conversion factor of 2.05 (based on total NO + NO<sub>2</sub>)</p>	<p>The Company reported and our assessment showed that discharges to air are in compliance with site permits and local standards, where these are set.</p> <p>However, as the Ukrainian permitted emissions levels are significantly above the IFC Guideline values, it is unlikely that the IFC Guidelines are consistently complied with. However, these are small combustion sources (between 6 to 16MWth) and this scale of combustion unit is not of a level to cause concerns in relation to ambient air quality. For example, In an EU context, these combustion units would not be permitted for their emissions under current regulatory regimes (which are applicable above 50 MW) and therefore this aspect is considered LOW RISK.</p> <p>However, a recommendation has been proposed for best practice purposes only.</p>	<p><b>ESAP item 3.1(a) has been defined to require a review of the control of the combustion units to ensure that NOx is minimised as far as practicable, in particular through reviewing the air feed to ensure that excessive NOx is not being produced as a result of high air feed. Risk Rating: Low</b></p>
<b>Air Emissions – Venting &amp; Flaring</b>		
<p>Measures consistent with the World Bank Global Gas Flaring and Venting Reduction Voluntary Standard should be adopted when considering flaring and venting options for onshore activities. The standard provides guidance on how to eliminate or achieve reductions in the flaring and venting of natural gas</p> <p>Continuous venting of associated gas should be avoided. The associated gas stream should be routed to an efficient flare system, although continuous flaring of gas should be avoided if feasible alternatives are available.</p> <p>Before flaring is adopted, feasible alternatives for the use of the gas should be evaluated to the maximum extent possible and integrated into production design.</p> <p>If flaring is necessary, continuous improvement of flaring through implementation of best practices and new technologies should be demonstrated.</p> <p>In the event of an emergency or equipment breakdown, or plant upset conditions, excess gas should not be vented but should be sent to an efficient flare gas system. Emergency venting may be necessary under specific field conditions where flaring of the gas stream is not possible, or where a flare gas system is not available, such as a lack of sufficient hydrocarbon content in the gas stream to support combustion or a lack of sufficient gas pressure to allow it to enter the flare system. Justification for excluding a gas</p>	<p>The Ukrtransgaz process is specifically designed for the storage of already processed natural gas and, as there is no processing carried out on site which requires the release of natural gas as part of the process, there is no identified need for flaring as part of the normal storage and transmission of the gas.</p> <p>Therefore, the release of significant amounts of gas should only occur in an abnormal situation, (e.g. an emergency to prevent over pressurisation which could result in mechanical failure of pipework or vessels carrying natural gas) or purging of pipework or equipment prior to maintenance work which requires for example a break-in.</p> <p>The venting is therefore infrequent in nature and release to atmosphere of methane minimised, hence does not appear to warrant a site flare system and none of the sites visited had such a flare.</p>	<p>BAT</p>

IFC BAT REQUIREMENT	COMPARISON	BAT
flaring system should be fully documented before an emergency gas venting facility is considered		
To minimize flaring events as a result of equipment breakdowns and plant upsets, plant reliability should be high (>95 percent) and provision should be made for equipment sparing and plant turn down protocols.		
Flaring volumes for new facilities should be estimated during the initial commissioning period so that fixed volume flaring targets can be developed. The volumes of gas flared for all flaring events should be recorded and reported.		
<b>Air Emissions – Fugitive Emissions</b>		
Methods for controlling and reducing fugitive emissions should be considered and implemented in the design, operation, and maintenance of facilities.	Equipment at the facilities is operational, and has been so for considerable periods of time, and therefore is unlikely to comply with all specifications of the guidelines.	BAT
The selection of appropriate valves, flanges, fittings, seals, and packings should consider safety and suitability requirements as well as their capacity to reduce gas leaks and fugitive emissions. Additionally, leak detection and repair programs should be implemented.	Management practices observed during site inspections appear to be effective in reducing fugitive emissions to a standard that would meet BAT requirements...	
Vapour control units should be installed, as needed, for hydrocarbon loading and unloading operations.	Gas is supplied and distributed by pipeline and no loading / unloading facilities are present.	N/A
<b>Water Emissions – Hydrostatic Testing Water</b>		
Water sourcing for hydrotesting purposes should not adversely affect the water level or flow rate of a natural water body, and the test water withdrawal rate (or volume) should not exceed 10 percent of the stream flow (or volume) of the water source.	No water is sourced from surface water bodies.	N/A
Erosion control measures and fish-screening controls should be implemented as necessary during water withdrawals at the intake locations.		
The disposal alternatives for test waters following hydrotesting include injection into a disposal well if one is available or discharge to surface waters or land surface.	Management reported that no biocides or other chemical additives are added to water when hydrotesting pipelines. Therefore, the disposal of used hydrotest water via the same disposal routes as produced water (rejection to reservoir) is not considered likely to present a significant risk of environmental harm.	BAT
<b>Water Emissions – Other Waste Waters</b>		
<ul style="list-style-type: none"> <li>Grey and black water from showers, toilets and kitchen facilities should be treated as described in the General EHS Guidelines.</li> <li>Sewage should be treated as per guidance in the General EHS Guidelines, including discharge requirements</li> </ul>	Sewage at all sites is discharged to municipal sewage systems for treatment.	BAT
<ul style="list-style-type: none"> <li>Separate drainage systems for drainage water from process areas that could be contaminated with oil (closed drains) and drainage water from non-process areas (open drains) should be available to the</li> </ul>	<p>Separate drainage systems are present at most facilities.</p> <p>Where combined drainage is present, this discharges either to sewer, or via treatment systems.</p>	<b>ESAP item 3.1(c) has been defined to cover that a review of management systems, operational &amp; maintenance</b>

IFC BAT REQUIREMENT	COMPARISON	BAT
extent practical.	However, detailed drainage maps were not provided so a full assessment of drainage systems could not be completed.	<b>processes and equipment for management of wastewater,</b>
<ul style="list-style-type: none"> <li>All process areas should be banded to ensure drainage water flows into the closed drainage system and that uncontrolled contaminated surface run-off is avoided.</li> </ul>	<p>Oil collection sumps are fitted below key plant, including compressors and boilers, in most locations. Oily water is generally discharged either via oil separators or to sewer. However, equipment is older and unlikely to meet all new BAT requirements.</p> <p>Storage tanks and associated pipework are generally inadequately contained, specifically.</p> <ul style="list-style-type: none"> <li>Most tanks are banded but bands were inadequate and/or in poor condition.</li> <li>Band walls were frequently damaged - variously cracked or with evidence of significant wall movement.</li> <li>Bands are only partially paved and large areas are not surfaced with hardstanding. Where hardstanding is present, it is in poor condition.</li> <li>Pipework frequently passes through band walls and is not sealed, compromising band integrity.</li> <li>Delivery pipework is outside containment and there is no robust system for inspection and testing of pipes and hoses. Hoses were not well protected and some were in poor condition.</li> <li>Tanker offload areas were generally not contained and spills would run off to land, site drainage or surface watercourses.</li> <li>Drainage from bands is not controlled, and bands discharge directly to site drainage.</li> <li>Underground pipework is not subject to routine inspection and testing at most sites.</li> <li>At Bilche-Volytsko-Uherske, glycol spills are washed to drainage with water.</li> <li>At Bilche-Volytsko-Uherske, the same pipework is used for deliveries of both oil and glycol.</li> </ul>	<b>stormwater and other water discharge should be conducted. Risk Rating: Low</b>
<ul style="list-style-type: none"> <li>Drainage tanks and slop tanks should be designed with sufficient capacity for foreseeable operating conditions, and systems to prevent overfilling should be installed.</li> </ul>	Tanks and sumps, where present, appear to be suitable for foreseeable volumes.	
<ul style="list-style-type: none"> <li>Drip trays, or other controls, should be used to collect run-off from equipment that is not contained within a banded area and the contents routed to the closed drainage system.</li> </ul>	<p>Sumps and collection pits are installed below key plant, including compressors and boilers, in most locations.</p> <p>Maintenance programs for these may not meet all BAT requirements (e.g. at Bilche-Volytsko-Uherske, the separator is visually inspected, but the construction (inside a grassed mound) means that this would have limited effectiveness, and no other maintenance is known to have been conducted since installation (&gt;30 years).</p>	

IFC BAT REQUIREMENT	COMPARISON	BAT
<ul style="list-style-type: none"> <li>Stormwater flow channels and collection ponds installed as part of the open drainage system should be fitted with oil / water separators.</li> </ul> <p>Separators should be able to achieve an oil and grease concentration of 10 mg/L</p> <p>Separators should be regularly maintained.</p>	<p>Oil separators are present on stormwater discharges at most sites. At Bogorodchany, no treatment systems are present on discharges to river.</p> <p>Separators and other treatment plants are older and unlikely to meet all BAT requirements.</p> <p>Maintenance regimes for systems is unlikely to meet BAT requirements</p>	
<ul style="list-style-type: none"> <li>Firewater from test releases should be directed to the facility drainage system.</li> </ul>	<p>Firewater would discharge to land or to facility drainage systems and, in most cases, could be retained in lagoons or tanks intended for routine produced water generation. However, there are no robust procedures to ensure that this would happen. There are no separate provisions for fire water retention.</p>	
<ul style="list-style-type: none"> <li>Equipment and vehicle wash waters should be directed to the closed drainage system.</li> </ul>	<p>No significant washing of equipment was identified during the site inspections. If washing is conducted, it is unclear where effluent would discharge.</p> <p>At Bogorodchany, management reported that produced water is reused onsite for cleaning and washing purposes, but that it can be re-injected to groundwater if required. The permitting situation for this discharge is unclear.</p>	
<ul style="list-style-type: none"> <li>Oily water from drip trays and from process equipment and pipelines should be routed to the closed drainage system.</li> </ul>	<p>Oily collection sumps are fitted below key plant, including compressors and boilers, in most locations. Oily water is generally discharged either via oil separators or to sewer. However, equipment is older and unlikely to meet all BAT requirements.</p>	
<p>For discharge to surface waters or to land, the effluent and waste guidelines in Table 1 should apply:</p> <p>Site-specific discharge levels may be established based on the availability and conditions in use of publicly operated sewage collection and treatment systems or, if discharged directly to surface waters, on the receiving water use classification as described in the General EHS Guidelines</p>	<p>Information provided indicates that discharges are in compliance with site permits and local standards, where these are set.</p> <p>However, the following observations were made regarding wastewater discharges</p> <ul style="list-style-type: none"> <li>Concentrations of some non-permitted parameters (especially methanol and glycol) in some samples appear high and no review of the source or significance of this is known to have been conducted</li> <li>The pH of discharges, while in compliance with site permit limits (5-9) is frequently below 6, which is a non-conformance with the guideline levels for discharge to surface water or land specified in the IFC Sector Guideline.</li> <li>No sampling data for other parameters specified in the IFC Sector Guideline was available, with the exception of Bogorodchany, where discharges were in conformance with the Guideline.</li> </ul>	<p>Review discharges of wastewater to identify potential sources of methanol and glycol recorded in sampling.</p> <p>Review concentrations of methanol and glycol in discharges against appropriate international guidelines.</p> <p><b>ESAP item 3.1(d) has been defined to cover that a review of concentrations of methanol and glycol in water discharges against appropriate international guidelines. Risk Rating: Medium</b></p>
<p>Cooling water effluent should result in a temperature increase of no more than 3°C at the edge of the zone where initial mixing and dilution</p>	<p>No sites operate direct offsite discharge of cooling water to surface water bodies.</p>	<p>N/A</p>

IFC BAT REQUIREMENT	COMPARISON	BAT
take place. Where the zone is not defined, use 100 m from point of discharge.		
Sewage should be treated as per guidance in the General EHS Guidelines, including discharge requirements	All sewage is discharged to municipal collection and treatment systems.	BAT
<b>Water Emissions – Surface Storage or Disposal Pits</b>		
If surface pits or ponds are used for wastewater storage or for interim disposal during operations, the pits should be constructed outside environmentally sensitive locations.	Wastewater holding pits, where present, are situated within the site boundaries.	BAT
<p>Wastewater pit construction and management measures should include:</p> <ul style="list-style-type: none"> <li>• Installation of a liner so that the bottom and sides of the pit have a coefficient of permeability of no greater than <math>1 \times 10^{-7}</math> centimetres per second (cm/sec). Liners should be compatible with the material to be contained and of sufficient strength and thickness to maintain the integrity of the pit. Typical liners may include synthetic materials, cement / clay type or natural clays, although the hydraulic conductivity of natural liners should be tested to ensure integrity;</li> <li>• Construction to a depth of typically 5 m above the seasonal high water table;</li> <li>• Installation of measures (e.g. careful siting, berms) to prevent natural surface drainage from entering the pit or breaching during heavy storms;</li> <li>• Installation of a perimeter fence around the pit or installation of a screen to prevent access by people, livestock and wildlife (including birds);</li> <li>• Regular removal and recovery of free hydrocarbons from the pit contents surface;</li> <li>• Removal of pit contents upon completion of operations and disposal in accordance with the waste management plan;</li> <li>• Reinstatement of the pit area following completion of operations.</li> </ul>	<p>At Bilche-Volytsko-Uherske water is held in in-ground concrete pits within the site perimeter, prior to treatment. The depth of these is not anticipated to be below the groundwater table and the potential for direct inflow of stormwater is low.</p> <p>At Bogorodchany, water is held in an underground tank prior to reuse. The construction and specifications of this tank are unclear.</p> <p>At Dashavske water is held in shallow earth lagoons prior to return to aquifer. This was described as having a geotechnical liner, but the specifications of this are not known.</p> <p>At other sites, produced water is held in above ground tanks prior to treatment and disposal.</p>	<p>BAT, but only if:</p> <ul style="list-style-type: none"> <li>• The ponds / lagoons are of sufficient integrity to retain effluent</li> <li>• The ponds / lagoons are not situated in a sensitive aquifer</li> </ul>
<b>Waste Management</b>		
Waste materials should be segregated into non-hazardous and hazardous wastes for consideration for re-use, recycling, or disposal.	Waste segregation was observed generally to be effective, and records of waste generation of different types are maintained.	BAT
Waste management planning should establish a clear strategy for wastes that will be generated including options for waste elimination, reduction or recycling or treatment and disposal, before any wastes are generated.	Wastes have been effectively identified and classified, rates of generation are monitored, and contracts are in place with licensed disposal contractors.	BAT
A waste management plan documenting the waste strategy, storage (including facilities and locations) and handling procedures should be developed and should include a clear waste tracking mechanism to track waste consignments from the originating location to the final waste treatment and disposal location.	<p>Wastes have been effectively identified and classified, rates of generation are monitored, and contracts are in place with licensed disposal contractors.</p> <p>However, arrangements for post collection tracking (e.g. manifesting, downstream tracking, etc.) are unclear</p>	<b>ESAP item 3.1(f) has been defined to cover that a review of post-collection waste tracking should be conducted. Risk Rating: Low</b>

IFC BAT REQUIREMENT	COMPARISON	BAT
<b>Naturally Occurring Radioactive Materials (NORM)</b>		
Where NORM is present, a NORM management program should be developed so that appropriate handling procedures are followed.	No NORM is known to occur at the sites.	N/A
Sludge, scale, or NORM-impacted equipment should be treated, processed, or isolated so that potential future human exposures to the treated waste would be within internationally accepted risk-based limits.	No NORM is known to occur at the sites.	N/A
Recognized industrial practices should be used for disposal. If waste is sent to an external facility for disposal, the facility must be licensed to receive such waste.	No NORM is known to occur at the sites.	N/A
<b>Hazardous Materials Management</b>		
Use chemical hazard assessment and risk management techniques to evaluate chemicals and their effects. Selected chemicals should have been tested for environmental hazards.  Select chemicals with least hazard and lowest potential environmental and / or health impact, whenever possible	The ISO18001 & ISO14001 certified EHS management system includes triggers for EHS risk assessment of chemicals.	
Use of Ozone Depleting Substances should be avoided	Cooling towers are present at several sites, but reportedly do not utilise chlorofluorocarbon (CFC) / hydrochlorofluorocarbons (HCFC) refrigerants. No other large cooling plant was observed during the site inspections	BAT
The use of asbestos containing materials (ACM) should be avoided in new buildings or as a new material in remodelling or renovation activities.  Existing facilities with ACM should develop an asbestos management plan which clearly identifies the locations where the ACM is present, its condition (e.g. whether it is in friable form with the potential to release fibres), procedures for monitoring its condition, procedures to access the locations where ACM is present to avoid damage, and training of staff who can potentially come into contact with the material to avoid damage and prevent exposure. The plan should be made available to all persons involved in operations and maintenance activities.  Repair or removal and disposal of existing ACM in buildings should only be performed by specially trained personnel following host country requirements, or in their absence, internationally recognized procedures.	Asbestos cement sheet is present extensively throughout buildings and structures in all locations. Some sheeting was observed to be damaged. There are no plans to remove the material and management reported that most of the materials cannot be removed at the moment.  No formal surveys or testing for the presence of asbestos have been conducted, and no formal management programs are in place.	Develop and implement asbestos management procedures that comply with BAT.  <b>ESAP item 3.3 has been defined to cover that a formal management program for identification and management of asbestos should be developed and implemented to minimise the potential for damage to asbestos containing materials and minimise potential for exposure to asbestos fibres. Risk Rating: Medium</b>
<b>Noise</b>		
Noise impacts should be estimated by the use of baseline noise assessments for developments close to local human populations. For significant noise sources, such as flare stacks at permanent processing facilities, noise dispersion models should be conducted to establish the noise level guidelines can be met and to assist in the design of facility siting, stack heights, engineered sound barriers, and sound insulation on buildings  (IFC SECTOR GUIDANCE FOR ONSHORE OIL	Limited environmental noise monitoring and no baseline assessment have been conducted. However, no significant boundary noise was noted at any of the facilities and no facilities have nearby sensitive receptors such as residential properties.	BAT

IFC BAT REQUIREMENT	COMPARISON	BAT
<p>&amp; GAS DEVELOPMENT)</p> <p>The preferred method for controlling noise from stationary sources is to implement noise control measures at source. Methods for prevention and control of sources of noise emissions depend on the source and proximity of receptors.</p> <p>Noise prevention and mitigation measures should be applied where predicted or measured noise impacts from a project facility or operations exceed the applicable noise level guideline at the most sensitive point of reception.</p> <p>(IFC GENERAL EHS GUIDELINES)</p>		
<p>Field related vehicle traffic should be reduced as far as possible and access through local communities should be avoided when not necessary.</p>	<p>The sites are generally situated very close to major road thoroughfares and, as such do not generate a significant proportion of the traffic using those routes.</p>	<p>BAT</p>
<b>Terrestrial Impacts and Project Footprint</b>		
<p>The visual impact of permanent facilities should be considered in design so that impacts on the existing landscape are minimized.</p> <p>The design should take advantage of the existing topography and vegetation, and should use low profile facilities if technically feasible and if the overall facility footprint is not significantly increased</p> <p>In addition, consider suitable paint colour for large structures that can blend with the background.</p>	<p>All plants are operational, and have been so for considerable periods of time.</p> <p>These guidelines are designed to apply to new developments, rather than ongoing operations, so are not directly applicable at the present time.</p>	<p>Guideline not directly applicable at this time.</p>
<b>Spills</b>		
<p>Spill prevention and control measures should include</p> <ul style="list-style-type: none"> <li>• a spill risk assessment</li> <li>• adequate corrosion allowance for the lifetime of the facilities or installation of corrosion control and prevention systems in all pipelines, process equipment, and tanks. Corrosion maintenance and monitoring programs to ensure the integrity of all field equipment. For pipelines, maintenance programs should include regular pigging to clean the pipeline, and intelligent pigging should be considered as required</li> <li>• secondary containment around vessels and tanks</li> <li>• shutdown valves to allow early shutdown or isolation in the event of a spill</li> <li>• automatic shutdown actions through an emergency shutdown system for significant spill scenarios so that the facility may be rapidly brought into a safe condition</li> </ul>	<p>EIA and safety risk assessments which cover spill risk to some extent and the presence of spill response materials indicates that risk has been assessed. However, it is not known if these meet BAT standards.</p> <p>Underground tanks are subject to periodic non-destructive testing. However, associated underground pipelines are not always included in this testing.</p> <p>Oil and chemical storage, particularly in above ground tanks, generally does not meet BAT standards:</p> <p>Secondary containment around above ground storage tanks was inadequate and bunding was in poor condition.</p> <p>Drainage from bunds is not controlled, and bunds discharge directly to site drainage.</p> <p>No emergency shutdown systems for oil were identified.</p>	<p>Conduct a review of systems, processes and equipment for storage facilities for oil, fuel and chemicals against applicable BAT requirements.</p> <p>This should include bunding of storage tanks, containment of delivery areas, inspection programs for delivery hoses and underground pipework and improved spill response procedures and equipment.</p> <p><b>ESAP item 3.1(e) has been defined to cover that a review of systems, processes and equipment for storage facilities for oil, fuel and chemicals against applicable BAT requirements should be conducted. This should include bunding of storage</b></p>

IFC BAT REQUIREMENT	COMPARISON	BAT
<ul style="list-style-type: none"> <li>leak detection systems. On pipelines consider measures such as telemetry systems, Supervisory Control and Data Acquisition (SCADA), pressure sensors, shut-in valves, and pump-off systems</li> <li>adequate personnel training in oil spill prevention, containment, and response</li> <li>spill response and containment equipment is deployed or available for a response</li> </ul>	<p>No large oil pipelines are present.</p> <p>Personnel were familiar with spill response procedures, although designated spill response actions are not always BAT, for example washing glycol spills to drainage.</p> <p>Stocks of absorbents are held on operational sites, although observations indicate that this is mainly limited to sand, with no purpose made absorbents.</p>	<p>tanks, containment of delivery areas, inspection programs for delivery hoses and underground pipework and improved spill response procedures and equipment. Risk Rating: Medium</p>
<p>All spills should be documented and reported. Following a spill, a root cause investigation should be carried out and corrective actions should be undertaken to prevent reoccurrence.</p>	<p>No significant incidents are known to have occurred.</p> <p>As for H&amp;S incidents, minor environmental incidents and near misses are not recorded at the local or corporate level and it would appear that staff are administratively and financially penalised for reporting/having accidents, or not meeting EHS related performance requirements.</p>	<p>Deviates from BAT.</p> <p>Refer to actions in H&amp;S section (Section 7.4).</p>
<p>A Spill Response Plan should be prepared, and the capability to implement the plan should be in place. The Spill Response Plan should address potential oil, chemical, and fuel spills from facilities, transport vehicles, loading and unloading operations, and pipeline ruptures.</p>	<p>Emergency action plans have been developed at all facilities. However, these are extensive documents containing more than 200 pages each. The manual is large and cumbersome and this does not appear to be practical in a real incident. The sequence of actions did not appear to be logical in some cases.</p> <p>The plans are focused on major process incidents involving large scale loss of containment and are very “rules” based and prescriptive as to the steps to be taken for each defined scenario.</p>	<p>Deviates from BAT.</p> <p>Refer to actions in H&amp;S section (Section 7.4).</p>
<b>Decommissioning</b>		
<p>A preliminary decommissioning and restoration plan should be developed that identifies disposal options for all equipment and materials, including products used and wastes generated on site. The plan should consider the removal of surface equipment and facilities, pipeline decommissioning and reinstatement.</p>	<p>No decommissioning plan has been developed for any of the sites.</p>	<p>BAT</p> <p>However, of note for Goldman Sachs, the presence of redundant facilities at some sites could present ongoing environmental liability risks (e.g. due to presence of asbestos)</p>
<b>Community Health and Safety</b>		
<p>To protect nearby communities and related facilities from these hazards, the location of the project facilities and an adequate safety zone around the facilities should be established based on a risk assessment.</p>	<p>Each of the sites is surrounded by a 1 km sanitary protection zone, in which development is controlled to prevent damage to gas infrastructure and minimise risks to third parties conducting activities in the zone. The exception to this is Uherske, where the SPZ was officially reduced by the government to 528 m.</p>	<p>BAT</p>
<p>A community emergency preparedness and response plan that considers the role of communities and community infrastructure as appropriate should also be developed.</p>	<p>The emergency response plans for the sites are largely focused on site impacts and response actions. The extent to which communities and community actions are incorporated into the plans was not ascertained.</p>	<p>Deviates from BAT.</p> <p>Refer to actions in H&amp;S section (Section 7.4).</p>

IFC BAT REQUIREMENT	COMPARISON	BAT
<p>Public training to warn of existing hazards, along with clear guidance on access and land use limitations in safety zones or pipeline rights of way should be provided.</p>	<p>At the design stage of significant development, a notification is placed in local newspapers informing the public of the proposal and requesting comments.</p> <p>At each site, a fixed time each week is assigned when the plant manager is available to answer queries from both internal and external stakeholders. A notice displayed at the site boundary provides details of this process and the relevant times.</p> <p>Specific permits for land use in the SPZ are also issued.</p>	<p>BAT</p>
<p>When there is a risk of community exposure to hydrogen sulphide from activities, the following measures should be implemented:</p> <ul style="list-style-type: none"> <li>• Installation of a hydrogen sulphide gas monitoring network with the number and location of monitoring stations determined through air dispersion modelling, taking into account the location of emissions sources and areas of community use and habitation;</li> <li>• Continuous operation of the hydrogen sulphide gas monitoring systems to facilitate early detection and warning;</li> <li>• Emergency planning involving community input to allow for effective response to monitoring system warnings.</li> </ul>	<p>Given the exclusion zones established around the facilities, there is considered to be a low risk of community exposure to hydrogen sulphide.</p>	<p>BAT</p>
<p>Unauthorized access to facilities should be avoided by perimeter fencing surrounding the facility and controlled access points (guarded gates).</p> <p>Public access control should be applied.</p> <p>Adequate signs and closed areas should establish the areas where security controls begin at the property boundaries.</p>	<p>All sites have full time security presence, both on site and patrolling the site boundary and well areas.</p> <p>Site boundaries have a physical barrier in the form of a concrete panel / wire mesh fencing, with razor/barbed on top of fencing at some sites. Non-electric fencing is in place at all facilities. Some sites have CCTV around site boundary, plus other sensitive parts of site, with motion sensors.</p>	<p>BAT</p>

## 6.3 ENVIRONMENTAL ISSUES

### RAW MATERIALS

The principal raw materials (other than natural gas) used at the facilities are lubricating oils, fuel oils and ethylene glycol.

Naftogaz reports to have adopted "Green Office" principles, with work carried out in the following areas: reduction of resource consumption, reuse and recycling, including introduction of electronic document management, and replacement of lamps with energy saving bulbs.

### UTILITIES & GREENHOUSE GAS EMISSIONS

Naftogaz reported that emissions of harmful substances to atmosphere from all production facilities in 2014 did not exceed the volume laid down in resolutions and standards for maximum permissible emissions, and also that it's emissions decreased by 4.4% overall, but this was not subdivided into operating units and application to the gas business is not known.

The company has implemented measures to improve energy efficiency and energy saving programs, in accordance with the provisions of the National Action Plan for implementation of the

Kyoto Protocol. In the first period of the Kyoto Protocol, the company's plants successfully implemented joint implementation projects which reduced more than 20 million tons of CO<sub>2</sub> equivalent and also attracted investments for modernisation of technological equipment.

In the period 2010-2014 the Company implemented a program to improve energy efficiency. By implementing energy efficiency measures, they achieved savings of fuel and energy resources of approximately 1,700,000 Tcf, including 1,309,200,000 m<sup>3</sup> of natural gas, 166,570,000 kW hour of electricity and 715,430 Gcal of thermal energy. In 2014 savings of fuel and energy were approximately 200,000 Tons of oil equivalent, including 151,718,000 m<sup>3</sup> of natural gas, 23,548,000 kWh of electricity and 86, 836 Gcal of heat energy.

The company has prepared a draft program to improve energy efficiency in the years 2015-2020. Implementation of a new energy efficiency program will allow the Company to save energy the in the amount of 889,560.t.u.p., including 715 million m<sup>3</sup> of natural gas, and 88 million. kWh of electricity and 168,900 Gcal of thermal energy.

The preceding paragraphs are based on information provided by Naftogaz but have not been verified within the scope of the assessment.

Reports provided by Naftogaz indicate the following CO<sub>2</sub> & methane emissions to air for 2014:

- Oparske – 27,685 tonnes CO<sub>2</sub>, 65 tonnes methane.
- Dashavske – 21,391 tonnes CO<sub>2</sub>, 213 tonnes methane.
- Bogorodchany – 24,326 tonnes CO<sub>2</sub>, 324 tonnes methane.
- Bilche-Volytsko-Uherske – 132,116 tonnes CO<sub>2</sub>, 1,909 tonnes methane (may also include emissions from Uherske).

Based on this, generation across the business exceeds the 100,000 tonne CO<sub>2</sub> threshold specified in the IFC guidelines for quantification and reporting of GHG emissions. Quantification of emissions has been conducted but it is not known if this has been done in accordance with internationally recognized methodologies and reporting procedures.

**ESAP item 3.1(b) has been defined to cover that it should be confirmed that internationally recognized methodologies and reporting procedures have been used for quantification of GHG emissions. Risk Rating: Low**

An assessment of direct greenhouse gas emissions is being provided under separate cover for submission to OPIC.

Transformers at the sites were reported to be oil filled and do not use Sulphur Hexafluoride (SF<sub>6</sub>).

## AIR EMISSIONS

Point source air emissions at the facilities largely comprise products of combustion from boilers and gases from compressor units. Other emissions are from small sources or fugitive releases, mainly arising from storage, handling and transfer of gas, oils and fuels and glycol. Management reported that pollutants released to air include hydrocarbons, CO<sub>2</sub>, NO<sub>x</sub>, methane, particulates, Sulphur Dioxide (SO<sub>2</sub>), Carbon Monoxide (CO), sulphuric acid, manganese and compounds, butane, hexane and methyl alcohol. All facilities have permits for emissions to air. Aggregate emissions information was provided, but this was not subdivided into operating units.

At Bilche-Volytsko-Uherske, odour compounds are added to gas for internal consumption (boilers, kitchens, etc.). No large scale odourisation of gas is conducted at any of the sites, with odourisation occurring at the distribution stage. No significant odours were noted during the site inspections.

The following observations were made during the site inspections regarding air emissions:

### Oparske:

- 3 x 3MW gas fired boilers, used for heating only. These are new units. Two units are operational at any time, with the third on standby. Also, two additional gas-fired boilers for gas preheating, and using ethylene glycol as the heating agent. 19 compressor units (turbine & motor type) are also operated.

- There are four energy recovery heat exchangers for heating of the buildings. This is instead of using the boiler houses for this purpose.
- There are a minimum of 8 historic piston-type compressors that are no longer in use and the site is awaiting the corporate level plan for decommissioning the compressors and associated infrastructure.
- No flaring is conducted at the site (no flares are present). Venting is used during maintenance such as cleaning of the condensers columns at which point any enclosed gas is vented to air. Emergency venting would also be used in over pressure situations.
- Although the infrastructure for the closed loop cooling system is still present, the site now has a new air-cooled system, which cools the gas from ~80oC to ~40oC.
- No specific monitoring of fugitive emissions from valves, flanges etc. is performed. Monitoring of gas concentration in soil is performed using a network of installed manholes. In addition to the ambient measurement systems installed within higher risk areas of the site, concentrations of certain parameters are monitored once per year at approximately twenty locations on the edge of the 1km sanitary protection zone. This monitoring is done by Ukrtransgaz who have a department who conducts these activities using six mobile laboratories.
- Emission limits for the facility are set in the air emission permit for the site and monitoring is conducted in compliance with this permit. The air emission permit lists all defined emission points on the site. In addition to monitoring, an inventory of annual emissions is also produced and reported to the regulator.
- Monitoring reports for 2015 indicate that no exceedances of air emission limits were identified.

#### **Dashavske:**

- 3 x 1.8 MW gas-fired boilers with a small amount of heat recovery. Two units are operational at any time, with the third on standby. There are plans to replace the boilers with more modern technology. A contracted maintenance company is used for boiler testing and maintenance. 6 compressor units (turbines) are also operated.
- No flaring is conducted at the site (the flare was decommissioning 4 years ago). Venting is used during start-up of turbines and in emergencies only.
- No specific monitoring of fugitive emissions from valves, flanges etc. is performed. Monitoring of gas concentrations in soil is performed using a network of installed manholes. There is also a central leak detection system monitored from the control room.
- Emission limits for the facility are set in the air emission permit for the site and monitoring is conducted in compliance with this permit. The air emission permit lists all defined emission points on the site. In addition to monitoring, an inventory of annual emissions is also produced and reported to the regulator.
- Monitoring reports for 2014 indicate that no exceedances of air emission limits were identified.

#### **Uherske:**

- 2 gas-fired boilers, used for heating only. One unit is operational at any time, with the other on standby. 20 compressor units (piston type) are also operated.
- Emission limits from stationary sources are set in the air emission permit and monitoring is conducted in accordance with this permit. In addition to monitoring annual efficiency testing is also conducted.

#### **Bogorodchany:**

- The emissions permit for the facility sets limits for emissions limits for all point sources at the site and requires monitoring. No exceedances of limits were reported. It was noted that the only limit specified for the boiler stack is for methane, with no limits for combustion products.

The site is uncertain of the rationale for this, and monitoring of the stack is done for combustion parameters.

- 19 compressor units (turbines & electrically driven) are also operated.
- Monitoring reports for 2015 indicate that no exceedances of air emission limits were identified.

#### **Bilche-Volytsko-Uherske:**

- 4 gas-fired boilers, used for heating only. 28 compressor units (turbines) (13 x 6.3 MW and 15 x 16 MW) are also operated.
- 3 energy recovery heat exchangers attached to compressor units, and used to provide heating for site buildings.
- Emission limits for the facility are set in the air emission permit, including CO<sub>2</sub> and NO<sub>x</sub> limits for the boilers. The permit includes a total of 409 identified emissions sources. However, most of these are fugitive type emissions and not monitored. Monitoring is conducted in compliance with this permit. The air emission permit lists all defined emission points on the site. In addition to monitoring, an inventory of annual emissions is also produced and reported to the regulator.
- Monitoring reports for 2015 indicate that no exceedances of air emission limits were identified.

The Company reported and our assessment showed that discharges to air are in compliance with site permits and local standards, where these are set. Where exceedances have been identified, these have been authorised by the regulators, and improvement programmes have been established to reduce emissions by 2018.

The only applicable IFC guidelines identified are summarised in Table 6-2.

**Table 6-2 Air Emission Standards**

	General EHS Guidelines Small Combustion Facilities			Onshore Oil & Gas Development Guideline
	Gas Boilers (3-50 MWth) <sup>a,b</sup>	Turbine (3 to <15 MWth) <sup>a,b</sup>	Turbine (15- to <50 MWth) <sub>a,b</sub>	
NO <sub>x</sub>	320 mg/Nm <sup>3</sup>	86.1 (Electric generation) 205 (Mechanical drive)	51.25	-
Dry Gas Excess O <sub>2</sub> Content	3%	15%	15%	-
H <sub>2</sub> S	-			5 mg/Nm <sup>3</sup>

- Applicable to small combustion process installations operating more than 500 hours per year, and those with an annual capacity utilization of more than 30%
- Lower emission values may apply in order to address potential cumulative impacts from the installation of more than one small combustion plant
- The General EHS Guideline gives these guideline values in parts per million (ppm). This has been converted to mg/Nm<sup>3</sup> using a conversion factor of 2.05 (based on total NO + NO<sub>2</sub>)

As the Ukrainian permitted emissions levels are significantly higher than the IFC Guideline values, it is unlikely that the IFC Guidelines are consistently complied with, and the sample monitoring data reviewed supports this conclusion. However, these are small combustion sources (between 6 to 16MWth) and this scale of combustion unit is not of a level to cause concerns in relation to ambient air quality. For example, In an EU context, these combustion units would not be permitted for their emissions under current regulatory regimes (which are applicable above 50 MW) and therefore this aspect is considered LOW RISK.

However, a recommendation has been proposed for best practice purposes only.

**ESAP item 3.1(a) has been defined to require a review of the control of the combustion units to ensure that NO<sub>x</sub> is minimised as far as practicable, in particular through reviewing the air feed to ensure that excessive NO<sub>x</sub> is not being produced as a result of high air feed.**  
**Risk Rating: Low**

## REFRIGERANTS AND COOLING TOWERS

Cooling towers are present at several sites, but do not utilise CFC / HCFC refrigerants. No other large cooling plant was observed during the site inspections.

## WATER USE AND WASTEWATER

### WATER USE

Naftogaz reported that the main sources of water for the organisation are groundwater wells, surface water abstractions and municipal mains water supply. The use of water from underground sources and surface water is carried out in accordance with permits. Mains supply is done under contract with the supplier. Water use by facilities has assigned limits approved by the territorial bodies of the Ministry of Environment of Ukraine. Aggregate emissions information was provided, but this was not subdivided into operating units. Water is treated prior to use, with physical and/or chemical treatment according to the technological regulations.

The following observations were made during the site inspections regarding water use:

#### **Uherske & Bilche-Volytsko-Uherske:**

- Water supply at Uherske and Bilche-Volytsko-Uherske is obtained from groundwater wells located at Uherske. These are owned and operated by Ukrtransgaz and licensed under the site water permit. An inspection by the Sanitary Authority in November 2015 identified problems with the quality of water and required improvement as it was being used for drinking and staff welfare facilities. Drinking water supply is obtained from a third party supplier. Water from the well is still used as process water, mainly for boiler top-up.

#### **Bogorodchany:**

- Water supply at Bogorodchany is obtained from on-site groundwater wells under the site water permit. Water quality is monitored and analysed both in-house and at offsite laboratories. Sample analysis reports were provided. Site management reported that all analyses have complied with local drinking water quality standards. Water from wells is also used for process water and fire fighting supply.

### WASTEWATER

Wastewater at production sites mainly comprises produced water from dehydration of gas. This is collected in tanks and, in most cases, is returned to the aquifer via injection or disposal wells under permit.

Surface water runoff is discharged via different routes at different sites (see descriptions below).

Domestic wastewater is discharged to municipal sewerage.

The following observations were made during the site inspections regarding wastewater:

#### **Oparske:**

- The gas dehydration system has 8 absorber units using di-ethylene glycol. There are 3 associated glycol regeneration units. Water from the gas is passed to the air-cooled condensers which drain to a dedicated tank then to the site industrial wastewater treatment plant, and is then pumped back into the reservoir formation under a water permit. A drainage tap was observed on the holding tank, situated over a site drainage channel leading to stormwater drainage. The industrial wastewater treatment plant primarily uses mechanical treatment to remove suspended solids and oil prior to reinjection of the water to the reservoir.

The plant includes a 25m<sup>3</sup> holding tank with sampling ports. Domestic water is not treated in this plant.

- Stormwater is treated via a separator for solids and oils and discharged to the municipal stormwater system.
- Firewater and foam would drain to ground or drainage networks.

#### **Dashavske:**

- The gas dehydration system uses ethylene glycol. There are associated glycol regeneration units. Produced water is managed in a closed loop system with subsequent reinjection back to the reservoir formation. Although the system was described as closed loop, a component of the system is the temporary storage of produced water from the dehydration units in an open pond with a 30m<sup>3</sup> capacity. The water is stored on the pond after an initial phase of separation to remove oils. The produced water was described as having a high sodium content (>25 mg/l). The exact design of the pond was not provided but was described to include a geotechnical membrane of some sort and to have 200% capacity compared to current needs based on the average water content of the gas. Produced water was historically also stored in a tank on-site which is now used occasionally for water storage.
- Stormwater is treated via a separator for oils and discharged to the municipal system.
- The water purification system is no longer in use, though there is not currently a plan in place for decommissioning. Any decommissioning plan would come from the corporate level.
- Sewage is pumped to the municipal system.
- Firewater and foam would drain to ground or drainage networks. CO<sub>2</sub> suppression is installed for the compressors.

#### **Uherske:**

- The gas dehydration system has 6 absorber units using di-ethylene glycol. Water from the gas is collected in a dedicated 35m<sup>3</sup> above ground tank and pumped to an offsite wastewater treatment plant. Stormwater runoff is also directed to this tank.

Site management reported that settlement treatment is undertaken and the treated water is pumped back into the reservoir formation under a water permit (combined permit with Bilche-Volytsko-Uherske). Discharges are sampled and analysed in-house. No non-compliances with licence limits were reported. Sample analysis reports provided for 2014 indicate that the pH of discharges is between 5.6 and 6.6, and methanol was detected in samples at 3.05-8.42 g/L.

#### **Bogorodchany:**

- The gas dehydration system uses di-ethylene glycol. Water from the gas is collected in a dedicated underground tank. Management reported that produced water is reused onsite for cleaning and washing purposes, but that it can be re-injected back into the reservoir formation if required. The permitting situation for this discharge is unclear.
- Discharge of up to 23,000 m<sup>3</sup> per year of stormwater to the Sadzhava River without treatment is permitted. Management reported that sampling is conducted onsite, at the point of discharge and downstream and analysed externally. Sample analysis reports provided for 2015 indicate that discharge were in compliance with permit limits and the guideline levels for discharge to surface water or land specified in the IFC Sector Guideline, and no non-compliances with licence limits were reported.
- Domestic wastewater is pumped to municipal sewer, with a permitted discharge of up to 8,800m<sup>3</sup> per year. Management reported that sampling is conducted at the point of discharge and sample analysis reports were provided.
- A redundant wastewater treatment plant is situated on site.

### Bilche-Volytsko-Uherske:

- The gas dehydration system has 14 absorber units using di-ethylene glycol. Water from the gas is directed to onsite wastewater treatment plant.
- Surface runoff and effluent (produced water and boiler blowdown) are collected in a combined drainage network leading to 3 x 50m<sup>3</sup> in-ground holding pits. Water is then passed through an on-site treatment plant prior to discharge to groundwater under a water permit (combined permit with Uherske). Treatment comprises a series of settlement ponds and oil separators, with final polishing in sand filters prior to injection back into the reservoir formation on a batch discharge basis.

Each discharge is sampled and analysed in-house. No non-compliances with licence limits were reported. It was noted that concentrations of ethylene glycol (not a licenced parameter) in groundwater were detected at 40 g/l in analyses from 2015. Sample analysis reports provided for 2015 indicate that the pH of discharges is between 5.4 and 6.8, and methanol was detected in one sample at 0.55 g/L.

Site management reported that the separator is regularly visually inspected, but the construction (inside a grassed mound) means that this would have limited effectiveness. No other maintenance is known to have been conducted since installation (>30 years).

- Domestic wastewater is pumped to municipal sewer.

The following general observations were made regarding wastewater discharges:

- No permit non-conformances were reported or identified.
- The pH of discharges, while in compliance with site permit limits (5-9) is frequently between 5 and 6, which is a non-conformance with the guideline levels for discharge to surface water or land specified in the IFC Onshore Oil & Gas Development Guideline. However, as discharges of produced water at all sites are injected back into the reservoir formation, rather than to other groundwater or surface water, this is not considered to be significant.
- No sampling data for other parameters or discharge to surface water or land specified in the IFC Onshore Oil & Gas Development Guideline was available, with the exception of Bogorodchany, where discharges were in conformance with the Guideline. However, as discharges of produced water at all sites are injected back into the reservoir formation, rather than to other groundwater or surface water, this is not considered to be significant.
- Methanol was detected in well samples at Uherske at concentrations of between 3.05-8.42 g/L. This is not a licenced parameter and no discharge limits were identified, but levels appear high. This may not be the final discharge point to groundwater. No further information on the context or potential source of the methanol was available. *Note: There may be linguistic / translation problems with the definition of "methanol" and there is potential that this could actually refer to a broader group of hydrocarbons, rather than only methanol.*
- Concentrations of ethylene glycol in discharges to groundwater were detected at 40 g/l in analyses from 2015 at Bilche-Volytsko-Uherske. This is not a licenced parameter and no discharge limits were identified, but levels appear high. No sampling for ethylene glycol was available for other sites.

A summary of the applicable guideline values and wastewater analysis results is presented in Table 6-3.

**ESAP item 3.1(c) has been defined to cover that a review of management systems, operational & maintenance processes and equipment for management of wastewater, stormwater and other water discharge should be conducted. Risk Rating: Low**

**ESAP item 3.1(d) has been defined to cover that a review of concentrations of methanol and glycol in water discharges against appropriate international guidelines. *Note: There may be linguistic / translation problems with the definition of "methanol" and there is potential that this could actually refer to a broader group of hydrocarbons, rather than only methanol.* Risk Rating: Medium**

Table 6-3 Water Discharge Standards

Pollutants	Units	Onshore Oil & Gas Dev Guideline  Guideline Value - discharge of produced water / hydrotest water to surface waters or to land <sup>a</sup>	BVU GW sample	BVU GW monitoring	BVU Waste-water sample	BVU Waste-water sample	BVU Reservoir of purified waters sample	Uherske GZP No 5 sample	Uherske GZP No 5 sample	Uherske Well sample	Uherske Well sample			
			13/07/15	2015	13/07/15	13/07/15	17/06/15	06/07/15	29/07/15	15/10/15	27/10/14	07/11/14	24/03/14	07/11/14
pH	pH	6-9	6.8			7.1	5.46	6.3	5.67	6.73	5.69	5.71	6.48	6.54
BOD	mg/l	25			10.8									
COD	mg/l	125			55									
TSS	mg/l	35	0		9									
TPH	mg/l	10												
Phenols	mg/l	0.5												
Sulphides	mg/l	1												
Chlorides	mg/l	600 (ave) 1200 (max)												
Heavy metals (total) <sup>b</sup>	mg/l	5												
Methanol	g/l	-					0.55	0	0	0	3.05	7.13	8.42	4.47
Diethylene Glycol	g/l	-		40										

- a. These guideline values have been included for reference purposes. However, as discharges of produced at all sites are injected back into the reservoir formation, rather than to other groundwater or surface water, these limits are not considered to be wholly applicable
- b. Heavy metals includes As, Cd, Cr,Cu, Pb, Hg, Ni, Ag, V & Zn

## WASTE GENERATION AND DISPOSAL

### SOLID WASTE

Wastes generated by operations include general household type waste, oil sludge, solid and liquid drilling sludges, scrap metal, construction waste, waste oils, batteries, tyres and fluorescent lamps. All locations maintain inventories of waste produced.

Waste is classified into four hazard classes. Waste generation for each class by the Company in recent years is shown in the table below.

	2011	2012	2013	2014
<b>Waste (x1,000 tonnes)</b>	160,054	164,99	134,48	137,3
<b>Hazard Class I</b>	0,109	0,134	0,035	0,072
<b>Hazard Class II</b>	2,219	0,332	0,136	0,24
<b>Hazard Class III</b>	3,156	7,538	4,554	10,911
<b>Hazard Class IV</b>	154,53	156,99	129,75	126,11

Naftogaz reported that the company operates the following waste management practices:

- Disposal of wastes in accordance with legislation and permits, to licensed waste contractors under formal agreements, and with required documentation.
- Storage of wastes pending disposal in designated containers and storage areas.
- Hazardous wastes are disposed of using waste contractors licensed by the Ministry of Ecology and Natural Resources of Ukraine.
- Disposal of wastes only to authorised landfills.
- Maintenance of waste records and provision of appropriate training and information.

Ukrtransgaz reported that wastes are disposed only to appropriately licensed waste contractors in accordance with applicable legislation.

In April 2014 a law amending other regulations was issued, which reduced the number of permits required (No 11930VII of 09.04.2014). This law removes the requirement for waste disposal permits and limits for waste disposal. Ivano-Frankivsk oblast administration has authority for waste management permits but, as of June 2015 the respective procedure had not been defined.

Recirculation of oils and glycol within the processes is undertaken where possible. Where this is not possible, waste is disposed using licensed contractors.

#### Oparske:

Wastes generated include

- extremely hazardous (waste with mercury).
- highly hazardous (wastes with lead and waste oils).
- low hazard (rubber items, domestic waste).

There is an annual declaration of the volume of classified waste generated at the site. A report on production and handling of wastes for 2014 and the 2015 waste declaration were provided. A contract is in place with a local contractor for disposal of waste oil. The company checked the contractor had the appropriate permits to handle the materials.

Reports on production of 6 different waste types were provided (used tyres, lead accumulators, fluorescent lamps, waste oils, domestic waste & waste from gas cleaning).

#### Dashavske:

Wastes generated include

- extremely hazardous (waste with mercury).
- highly hazardous (wastes with lead and waste oils).
- low hazard (rubber items, domestic waste).

There is an annual declaration of the volume of classified waste generated at the site. A report on production and handling of wastes for 2014 and the 2015 waste declaration were provided. A contract is in place with a local contractor for disposal of waste oil. The company checks the contractor had the appropriate permits / licenses to handle the materials, including a review of the State registry of licensed companies.

Reports on production of 10 different waste types were provided (electrode residue, scrap metal, used oil filters, wood chips, used tyres, lead accumulators, fluorescent lamps, waste oils, domestic waste & waste from gas cleaning).

#### **Uherske & Bilche-Volytsko-Uherske:**

Wastes generated include

- extremely hazardous (waste with mercury).
- highly hazardous (wastes with lead and waste oils).
- low hazard (rubber items, domestic waste).

There is an annual declaration of the volume of classified waste generated at the site. This is a combined declaration covering both sites. A report on production and handling of wastes for 2014 was provided. Contracts are in place with licensed contractors for disposal of wastes.

Reports on production of 10 different waste types were provided (electrode residue, scrap metal, used oil filters, wood chips, used tyres, lead accumulators, fluorescent lamps, waste oils, domestic waste and waste from gas cleaning).

#### **Bogorodchany:**

Wastes generated include

- extremely hazardous (waste with mercury).
- highly hazardous (wastes with lead and waste oils).
- low hazard (rubber items, domestic waste).

There is an annual declaration of the volume of classified waste generated at the site. A permit was held until 2014, but was not renewed, due to a change in requirements. Ivano-Frankivsk oblast administration has authority for waste management permits but, as of June 2015 the respective procedure had not been defined. No declaration has been made since expiry of the previous permit, but one will be submitted in 2016. A report on production and handling of wastes for 2014 was provided. Contracts are in place with licensed contractors for disposal of wastes.

Reports on production of 6 different waste types were provided (used tyres, lead accumulators, fluorescent lamps, waste oils, domestic waste & waste from gas cleaning).

## **HAZARDOUS MATERIALS MANAGEMENT**

Key production facilities that use hazardous chemicals are regulated according to the Cabinet of Ministers of Ukraine №440 from 20.06.95r. The Company reported that permission for production, storage, transport, use, burial, destruction and disposal of toxic substances has been obtained. Plants and equipment for activities involving hazardous chemical substances have been developed in accordance with this and put into commission with the participation of public health and safety inspectors.

The Company reported that the facilities have passed certification and declaration for high risk operations and that a mandatory liability insurance business covers harm that may be caused by fires and accidents at high-risk facilities, or at sites where operations may lead to environmental or public health issues. However, no additional information was available relating to this.

The Company has developed and validated manufacturing instructions for working with hazardous chemical substances, and dedicated employees are appointed responsible for

monitoring and handling hazardous chemical substances. Management reported that staff are trained in accordance with NPAOP-0.00-4.12-05.

Emergency response plans (ERP) have been developed for all operational facilities and are reviewed on a 5 yearly basis. The Company reported that these ERP have been approved by the State emergency service and by regional administrations regulators. It was noted that the ERP are extensive documents containing more than 200 pages each, are large and cumbersome, and this does not appear to be practical in a real incident. The sequence of actions did not appear to be logical in some cases. The plans are focused on major process incidents involving large scale loss of containment and are very “rules-based” and prescriptive as to the steps to be taken for each defined scenario. Emergency response is discussed further in Section 7.

Stocks of absorbents are held on operational sites, although observations indicate that this is mainly limited to sand, with no purpose made absorbents. Naftogaz reported that expanded perlite is available, but none of this material was observed.

The following observations were made during the site inspections regarding storage of hazardous materials:

#### **Oparske:**

- Six 1,500 litre above-ground storage tanks (ASTs) of fuel oil (sufficient for one month supply), situated in a concrete block bund. The bund was cracked and damaged, including on the base, with some vegetation growing in the bund. A sump in the bund reportedly has a separator to remove oil from discharges, but bund discharge cannot be isolated in the event of a fuel release. Used oil drums were stored in an uncontained area adjacent to the oil bund. This area is concrete but discharges to a nearby grassed area, and potentially on to stormwater drains. There were no oil spill response materials in the immediate area.
- Oil spills from failures of other units such as the compressors are designed to be captured in metal sumps that were visible beneath the compressors. Site management reported that these sumps are pumped out manually.
- The ERP includes procedures for notification of local administrations. Emergency response exercises, which can involve local administrations, are conducted annually.
- The Company reported that no environmental or safety incidents have occurred in the past 5 years.

#### **Dashavske:**

- The site has 12 main storage tanks: 4 for turbine lubricating oil; 2 for vehicle fuel oil; and, 6 for ethylene glycol for the dehydration units. There were also several smaller tanks including those for waste oil. All tanks were contained within a single bunded area. The Chief Engineer verbally confirmed that the size of the bund is greater than 100% of the combined volumes of the tanks though exact design details were not available. The bund appeared to be in good condition though some vegetation growth was apparent between the concrete tiles of its base. Procedures for removal of any snow accumulation were also unknown.
- Oil spills from failures of other units such as the compressors were designed to be captured in metal sumps that were visible beneath the compressors. There was slight staining on the concrete in the area of the former fuelling station which is no longer in use.
- The ERP was developed by a third party specialist, and has been approved by several authorities including the local authority.
- The Company reported that no environmental or safety incidents have occurred in the past 5 years.

#### **Uherske:**

- Eight bitumen coated stainless steel underground storage tanks (USTs), four containing lubricating oil to supply compressors and four containing ethylene glycol for cooling. The USTs are ultrasonically tested 5 yearly (last done May 2015) and the levels of each system

are monitored monthly. No testing is conducted of the underground lines associated with the USTs.

**Bilche-Volytsko-Uherske:**

- 32 steel ASTs, 12 containing oil and 20 containing ethylene glycol, situated in a concrete bund with a gravel base. Site management reported that a rubberised lining is installed below the gravel, but this was installed in the 1970s and the exact type and condition are not known. Pipework passes through the bund wall and is not sealed. No gauging is fitted to the tanks, with inventory control done using manual dips only.

**Bogorodchany:**

- Six steel ASTs, three containing oil and three containing ethylene glycol, situated in a concrete bund. The bund was in very poor condition, with areas of cracked or missing concrete, and sections of the wall have been lowered to accommodate pipes. No discharge point from the bund was observed and management reported that no discharge occurs, suggesting that the bund has poor retention.
- Steel USTs, containing diesel and petrol for site vehicles. The USTs are cleaned 5 yearly and ultrasonically and weld tested 10 yearly (last done 2008) and test reports indicate that underground lines associated with the USTs are also tested. UST levels are monitored periodically. Two bowsers are situated near the tanks. The area around the bowsers is unpaved and some staining was observed.
- Stormwater drains at the site discharge directly to a nearby river with no pre-treatment.
- A roofed drum store, paved with concrete but not bunded.

Oil and chemical storage, particularly in above ground tanks, generally does not meet BAT standards:

- Most above ground storage tanks are bunded but bunds were inadequate and/or in poor condition. Bund walls were frequently damaged - variously cracked or with evidence of significant wall movement. Bunds are only partially paved and large areas are not surfaced with hardstanding. Where hardstanding is present, it is in poor condition.
- Pipework frequently passes through bund walls and is not sealed, compromising bund integrity.
- Delivery pipework is outside containment and there is no robust system for inspection and testing of pipes and hoses. Hoses were not well protected and some were in poor condition.
- Tanker off load areas were generally not contained and spills would run off to land, site drainage or surface watercourses.
- Drainage from bunds is not controlled, and bunds discharge directly to site drainage.
- Underground pipework is not subject to routine inspection and testing at most sites.
- At Bilche-Volytsko-Uherske, glycol spills are washed to drainage with water.
- At Bilche-Volytsko-Uherske, the same pipework is used for deliveries of both oil and glycol.
- Stocks of absorbents are held on operational sites, although observations indicate that this is mainly limited to sand, with no purpose made absorbents. Naftogaz reported that expanded perlite is available, but none of this material was observed.
- Emergency action plans have been developed at all facilities. However, these are extensive documents containing more than 200 pages each. The manual is large and cumbersome and this does not appear to be practical in a real incident. The sequence of actions did not appear to be logical in some cases. The plans are focused on major process incidents involving large scale loss of containment and are very "rules" based and prescriptive as to the steps to be taken for each defined scenario. This is covered in more detail in Section 7.

**ESAP item 3.1(e) has been defined to cover that a review of systems, processes and equipment for storage facilities for oil, fuel and chemicals against applicable BAT requirements should be conducted. This should include bunding of storage tanks, containment of delivery areas, inspection programs for delivery hoses and underground pipework and improved spill response procedures and equipment. Risk Rating: Medium**

## ENVIRONMENTAL NOISE EMISSIONS AND CONTROL

Boundary noise monitoring conducted at Uherske identified boundary noise of up to 47 dBA, reported to be within the limit of 55 dBA. No environmental noise monitoring has been conducted at other facilities.

No significant boundary noise was noted at any of the facilities and no facilities have nearby sensitive receptors such as residential properties.

## DELETERIOUS MATERIALS MANAGEMENT

### ASBESTOS-CONTAINING MATERIALS

Asbestos cement sheet is present extensively throughout buildings and structures in all locations. Some sheeting was observed to be damaged. There are no plans to remove the material and management reported that most of the materials cannot be removed at the moment. No formal surveys or testing for the presence of asbestos have been conducted, and no formal management programs are in place.

**ESAP item 3.3 has been defined to cover that a formal management program for identification and management of asbestos should be developed and implemented to minimise the potential for damage to asbestos containing materials and minimise potential for exposure to asbestos fibres. Risk Rating: Medium**

### POLYCHLORINATED BIPHENYLS (PCBS)

Oil filled transformers are present at the sites, but management reported that no PCBs are present in any oils. No documents relating to this were reviewed.

### RADIOACTIVE SUBSTANCES

No radiation sources were identified or reported to be present at the sites.

## SOILS, SURFACE AND GROUNDWATER CONTAMINATION

No contaminated land site investigations are known to have been conducted at any of the sites, and there is no known regulatory driver for these at present.

No specific evidence of releases to soil and/or groundwater (e.g. staining of surfaces, pooled oils or leaking pipes) were noted during the site inspections and management reported that no significant spills or other releases have occurred.

However, given the age of the facilities (with a long history of oil & fuel storage and compressor operation involving oils), the condition of fuel and chemical storages, particularly with regards to inadequate bunding, and the lack of containment around fuel offloading areas, there is a high potential for soil and/or groundwater contamination to be present in parts of all the sites.

**ESAP item 3.2 has been defined to cover assessment of each of the sites to identify site specific areas of potential concern in relation to historic soil and potentially associated groundwater contamination. Risk Rating: Medium**

# 7 SITE HEALTH AND SAFETY PERFORMANCE

Health and safety monitoring is undertaken at a corporate level which takes into account accidents but no near misses.

## 7.1 ACCIDENT REPORTING AND INVESTIGATION

Statistics from Naftogaz for the period 2012-2014 listed 9 fires: 4 in 2012; 2 in 2013 and 3 in 2014. These were reported to be of an insignificant nature; however this could not be confirmed as incident reports were not seen.

Statistics from Ukrtransgaz for the period 2012-2014 listed 4 fatalities: 1 in 2012; 3 in 2013 and 0 in 2014. Reportedly, incident reports were completed for these fatalities but these were not seen by the audit team. One fatality involved a helicopter crash whilst a subcontractor was surveying the gas pipeline. Another was reportedly an instance of unauthorised transportation of gas, the outcome of the incident report stated that this was caused by staff negligence. It is not clear what actions were put in place to prevent recurrence as the incident report was not made available.

Each region maintains their own register for accident reporting, held at the administrative office within the Health and Safety department. Reporting is then consolidated at a corporate level. An Accident Investigation procedure is in place, based on the Ukrainian Regulatory Regulation for Incidents at Production sites. At the Uherske site the procedure was described as incorporating the following:

- Details of the problem;
- The solution identified;
- Targeted action taken;
- Completion date of the action; and
- Signatory by senior management as complete.

It was reported that a general approach of root cause assessment is also undertaken to derive actions aimed at preventing recurrence, such as training. During interview, both Lviv and Ivano-Frankivsk regional headquarters confirmed that no reportable accidents had occurred over the past 5 years.

Minor Incidents and near misses are not recorded at the local or Corporate level and it would appear that staff are administratively and financially penalised for reporting/having accidents, or not meeting H&S related performance requirements. It is recommended that the safety culture is improved and accident/incident/near miss reporting should be encouraged rather than penalised.

## SIGNIFICANT INCIDENTS

Lvivtransgaz and the Ivano-Frankivsk regional headquarters reported that no significant accidents had occurred in the last 5 years. **However, the focus is mainly on physical injury and not on the acute effects of long term exposure to, for instance noise (Regulators highlighted that staff were exposed to high levels on noise on the Uherske site).**

**ESAP item 2.3 has been defined to cover that the scope of accident/incident reporting should be improved. Risk Rating: Low**

Although said to be non reportable to the Regulator, the Dashavske site in the Lviv region did have an accident that occurred during a maintenance activity involving a metal object falling from height injuring a contractor. Site management explained that although the incident did not meet the reportable criteria, it was considered as significant and a thorough investigation was undertaken on site.

## 7.2 HEALTH AND SAFETY TRAINING

### COMPANY STAFF

All employees within both regions visited are provided with health and safety training soon after joining. This is comprised of:

- Fire risk and actions in the event of a fire;
- Evacuation procedure and assembly point; and
- Site safety rules (e.g. no smoking/ignition sources allowed on site).

Visitors and contractors receive a site EHS induction.

In addition within Lvivtransgaz it was reported that operators receive more extensive training, including regular ongoing emergency management and response training based on scenarios within the emergency plan. This training is assessed formally on completion. Examples include:

- First Aid training carried out by medical profession for designated staff;
- Accident Investigation training is delivered by an approved training organisation and certificated.
- Training for electrical work with Ex Rated systems and equipment, in order to work on electrical equipment and systems located in potentially flammable atmospheres, is undertaken by electricians who undergo additional training and this is licenced by an external authority.
- High Voltage training is carried out by a special commission and electrical staff have electrical safety permits and licences.
- Each “service” of the Emergency Management Team receives specialist training (e.g. underground storage, compressor house, etc.) with practices once per year.
- Emergency Response Training is carried out once every 3 years and this is a complex training programme involving the internal departments, the medical and fire departments and local administration. In addition more local emergency training is undertaken involving the local fire brigade every three months.
- Senior management are provided with further safety training on an annual basis.

After the health and safety training has been completed, staff must sign a register to state they have received the training.

The training delivered at the Bogorodchany site within the Ivano-Frankivsk region was more limited. Aside from the initial job specific training no refresher or safety orientated training was said to be provided. Occasionally a one day focused training day will cover a series of H&S topics but this was said to be infrequent.

**ESAP item 2.2 has been defined to cover the recommendation that the training plan at the Bogorodchany site is reviewed to include refresher and safety orientated training. Risk Rating: Medium**

### RISK ASSESSMENTS

For hazard evaluation, Ukrainian Safety Codes appear to set out the standardised hazard scenarios and control methodologies to be used; these included the following types of scenarios as seen in the Emergency Plan (dated June 2011):

- Emission of natural gas
- Gas zone spreading
- Open fire

- Fire ball
- Explosion

EIA and safety risk assessments are carried out for new equipment in order to manage the risks to an acceptable level. However, there did not appear to be process similar to HAZID/HAZOP/Basis of Safety when assessing design/ changes and modifications to plant.

**ESAP item 2.10 has been defined to cover that as a best practice the sites adopt and implement internationally recognised HAZID and HAZOP methodologies for:**

- **New plant and process introduction**
- **Management of Change - incorporating equipment, plant, process and organisational change in scope**

**Risk Rating: Medium**

## **OHS PROCEDURES**

### Safe Systems of Work

At all sites, it was reported that there is a formal permit to work (PTW) system in place for activities undertaken on site such as hot work, excavations greater than 1.5m and confined spaces. The list matches that in the State Regulations on Hazardous Works (COVE 49.5 30019801-101:2102) which also specifies the form of the permit to work. A number of completed documents were provided for review after the site visits; e.g. internal permits, job orders, training records, plans for the work execution, orders for execution of works, reporting on execution of works, working schemes with what was to be done. Additionally, Instruction N 2.3 for safe work (Hot work) at Bilche-Volysko-Uherske was provided as an example procedure and the content addressed the following areas:

- Scope of application,
- terms and definitions, abbreviations,
- organisation of the fire works,
- preparation before the works,
- execution of works,
- completion,
- emergency situations during the works,
- communication during preparation and execution,
- responsibilities,
- attachment with schemes for the hot work

It was reported that there is a list of high hazards works that require permits prior to commencement of the work. Electrical work follows a LOTO approach. The issue of PTW is the responsibility of the Site Chief Engineer. There are procedures for normal operation of the process equipment and plant.

There is also an extensive emergency plan which the Despatch Operator is required to refer to in the event of an emergency as it reportedly covers all possible scenarios and the steps they are to take.

Based on interviews there is no current system of PTW auditing and during the site walkovers there were a number of instances where activities under a PTW didn't appear to have the appropriate controls in place (see examples provided in Contractor section below).

**ESAP item 2.4 has been defined to cover the recommendation that audits of the use of the PTW system are conducted to ensure appropriate controls are being used.**

**Risk Rating: Medium****CONTRACTORS**

During interviews with site personnel, a robust process for managing contractors working on site was described. Subsequently, the following list of documents was provided to demonstrate its application:

- Application from a contractor to perform works,
- State license issued to the contractor,
- Order from contractor to appoint personnel to perform works,
- Protocol of the meeting of commission on safety,
- No objection from Ukrtransgaz to perform the works,
- Order-permit issued by the Bilche-Volytsko-Uherske to perform the works issued by the Director,
- Completion certificate.

Based on the information provided, the process would appear adequate. However during site walk arounds, the audit team observed several occasions which could indicate that contractor management is not always robustly implemented, e.g. at Lviv Oparske site there was an excavation taking place to expose a buried pipe for inspection. The excavation appeared to be approximately 1.6-1.75 metres deep but had no shuttering to prevent collapse of the walls and no barriers to prevent unauthorised access. Similarly, at Lviv Uherske site work was being undertaken to install a sunken services duct, approximately 0.3 to 0.5m deep and 0.5m wide, but there were no warning signs or barriers to prevent people from falling in.

**7.3 AUDITS, PROGRAMMES AND INSPECTIONS**

It was reported that Naftogaz has an annual internal audit programme and audits take place before the autumn and winter. Regulatory bodies also check compliance and carry out inspections. With regards to Ukrtransgaz, both Naftogaz and the Regulator undertake audits.

The authorities conducting periodic safety inspections can fine the company if there are any breaches.

Two sites (Bogorodchany on 10th November 2015 and Uherske had been subject to regulatory audits in the last year. Reportedly, the findings were mainly minor in nature with key points listed below:

- Act of State Committee of Ukraine on Industrial Safety (Derhgirpromnagliad), Western inter regional state inspection of industrial; safety and occupational safety in oil and gas complex No 5-5-58 of 18.05.2010. The act has a general positive conclusion but lists a number of comments on deviations, such as some unimplemented repairs, missing markings etc.
- Act of complex check of automatic fire extinguishing systems of gas compressor units in the shops 1, 2, 3, 1A, 4 during 21-25 June 2015. The conclusion is positive.
- Act of the State Labour Office on check of business entity of 17 November 2015 No 13/07/087/0027 on the occupational safety management: General issues, Safety of works implementation, Safe operation of facilities, installations equipment and machinery. In general the conclusion is positive, but 66 deviations have been revealed for Bogorodchany and Uherske. Based on the implemented check it was prohibited to operate
  - balloons of carbon dioxide No 81898 and 83509 of the fire-fighting system in gas compressor unit No 15 and
  - space heating boiler АГКВ 11,5-1/2-2-В-11-УХЛ4,2
- Act of State Committee of Ukraine on Industrial Safety (Derhgirpromnagliad), Western inter regional state inspection of industrial; safety and occupational safety in oil and gas complex No 7-3/3 of 14.01.2014. The act has a general positive conclusion but lists a number of comments on deviations, such as some unimplemented repairs, missing markings etc. The act confirms elimination of the deviations described in Order No 7-3/33 of 26 March 2013.

- Order of State Committee of Ukraine on Industrial Safety 7-3/3 of 11.10.2013 on eliminations of revealed deviations such as:
  - Repair of anticorrosion coating on gas separator
  - Information on technical inspection of underground vessels of odorant is not registered in their passports
- Order of State Committee of Ukraine on Industrial Safety No 8-7/44 of 11.10.2013 on eliminations of revealed deviations related to elevators, such as
  - Missing operation permit for elevators
  - Missing information of passports for elevators
  - Missing lights on the access roads to the engine rooms

For the Oparske site, key findings from the last inspection by the safety authorities were:

- Act of the State Labour Office on check of business entity of 20 November 2015 No 13/13/087/0028 on the occupational safety management: General issues, Safety of works implementation, Safe operation of facilities, installations equipment and machinery. In general the conclusion is positive, but 59 deviations have been revealed

For the Bogorodchany site, key findings from the last inspection by the safety authorities:

- Act of the State Labour Office on check of business entity of 18 November 2015 ІФ No 0034-03 on the occupational safety management: General issues, Safety of works implementation, Safe operation of facilities, installations equipment and machinery. In general the conclusion is positive, but 49 deviations have been revealed
- Plan of measures for elimination of the deviations registered in the above Act with the respective deadlines was prepared.
- An improvement notice N 1231 dated 02.11.15 as a result of the site inspection dated 26-30.09.15 by the State Department of Sanitary Epidemiological Service in Lviv Oblast
  - Provide production staff drinking water or organise delivery of water – deadline 01.01.16;
  - Develop sanitary hygienic measures in order to mitigate hazardous factors, e. g. noise – deadline 01.01.16;
  - Provide production staff with means for drying of boots – deadline 01.01.16;
  - Assure execution of recommendations of the last medical check of the staff in 2015 by providing sanitary-resort medical treatment – deadline 01.01.16

For the Dashavske site, key findings from the last inspection by the safety authorities included:

- A plan for measures for improvement of occupational safety

Within Ukrtransgaz there is a 4 level internal audit/inspection programme:

- Operator, daily
- Area Line Manager, weekly
- Site Chief Engineer, quarterly
- Corporate, annual.

It was reported that the daily operator safety inspections follow a pre-defined route and checklist; items such as general conditions of equipment and workplace, measurement of explosive gas levels are recorded.

Weekly inspections are undertaken by the Area Line manager and quarterly audits by a team (Safety Engineer, Ecologist, Service Heads) led by the site Chief Engineer following which a formal report is issued.

The findings are collated and used as input to forward action planning. Orders are issued based on the audit findings, defining the action needed, person responsible and terms for execution.

The Chief Engineer is informed when the action is complete and he is required to sign off the action plan and submit this to the Regulator (if necessary).

On the face of it, the internal audit programme appears to be comprehensive but clearly the key findings raised by the Regulator in November at Uherske (water & noise) should have been captured earlier.

**ESAP item 2.5 has been defined to cover the recommendation that the audit scope and methodology is reviewed. Risk Rating: Medium**

## 7.4 HEALTH AND SAFETY RISK MANAGEMENT

### PERSONAL PROTECTIVE EQUIPMENT (PPE)

Upon arrival at the sites the audit team were given a safety helmet in terms of PPE but safety glasses or footwear were not required.

On most sites, those working in operational areas were observed to wear basic PPE (hard hat, safety footwear and coveralls). Operating procedures did include a list of PPE, but did not necessarily instruct staff to wear/ use PPE and PPE was not always available in work areas (safety glasses, ear defenders).

At the Uherske site, before visiting the main gas compressor area which was a designated hearing protection area, a wad of cotton wool like material was provided to the auditors intended to be compressed and put in the ear. This was not considered an effective means of hearing protection even on a short-term basis in the gas compressor locations. Operators were reportedly provided with ear defenders, however it was observed that they were not designed to be used with safety helmets and operators were observed not wearing hearing protection at times.

**ESAP item 2.6 has been defined to cover the recommendation that PPE usage and availability be reviewed across the sites. Risk Rating: Low**

### WORKING AT HEIGHT

Each of the sites has a safe system of working. Fall arrest equipment is available and consists of a full body safety harness and lanyard. Harnesses and lanyard are periodically inspected by a competent person, as well as before use by the user.

All significant fixed ladders have hooped restraints starting at about 3 metres from their base plate. For tall structures, there are intermediary platforms at suitable intervals.

Access gantries and walkways were rusted and in poor condition in some locations, e.g. tank access platforms at Bilche-Volytsko-Uherske.

**ESAP item 2.11 has been defined to cover the recommended that a programme of inspections of access platforms is conducted and any necessary repairs / replacements made. Risk Rating: Low**

### CONFINED SPACES AND CONFINED SPACE ENTRY

There is reportedly a confined space procedure and authorisation in place at all sites as per the legal requirements.

### PRESSURE SYSTEMS

At all sites visited, the Chief Engineer stated that they were the responsible person for managing the safety of pressure systems on site in line with the Regulatory requirements.

The most significant pressure systems relate to the natural gas compression and drying operations.

## WORKING ON ELECTRICAL SYSTEMS

Training for electrical work with Ex Rated systems and equipment, in order to work on electrical equipment and systems located in potentially flammable atmospheres, is undertaken by electricians. They undergo additional training and this is licenced by an external authority.

High Voltage training is carried out by a special commission and electrical staff have electrical safety permits and licences.

## LIFTING EQUIPMENT

At both Oparske and Uherske, the site Chief Engineer stated that they are responsible for managing the safety of the lifting equipment on site.

At Bilche-Volytsko-Uherske Facility site, all the lifting equipment was manual and reportedly checked and maintained. The lifting limits were not displayed on the beam and there were no visual marking on beam to indicate load or local record of inspections or maintenance checks.

At the Bogorodchany site an inspection report for the crane and lifting chains was provided (last inspected in 2014 and on a frequency of once/3 years for crane and once/year for chains). The driver held appropriate qualifications. The Crane itself should be signed with the maximum weight limit.

**ESAP item 2.12 has been defined to cover the recommendation that all lifting equipment is marked with its safe working load. Risk Rating: Medium**

## SAFETY SIGNAGE

Directional signage for evacuation routes was mainly limited to administration buildings. There was no assembly area signage observed and none was flagged at the safety induction. There were a limited number of signs showing a directional arrow, mostly containing text.

Very limited use of hazard signage was observed and there was use of non-standard signage in some areas (e.g. skull and cross bones for “no ignition sources”).

At the Dashavske site a redundant underground tank brought to the surface was signed ‘explosive’.

**ESAP item 2.7 has been defined to cover the recommendation that a full survey of all sites is carried out to identify the required safety signage as well as the condition and adequacy of current signage. Risk Rating: Low**

## GENERAL WORKFORCE WELFARE ARRANGEMENTS

Generally the welfare facilities provided were good across all sites. At Dashavske there is a social room and site solarium and all employees has access to dining facilities.

At the Oparske site, there are changing rooms and lockers provided near the Control room. Toilets are available in the main administration building, control room building and cafeteria building and there is an eating area also provided in the control room building. Drinking water is available which is supplied from the public system.

At Uherske, a changing area is provided and toilets are available in the main administration building, and control room. The November 2015 Sanitary Inspection report by the Authorities, actioned the site to provide suitable quality drinking and washing water as it was being provided from a well and not from the public drinking water supply.

## NOISE EXPOSURE

Noise levels are measured on a number of the sites both within the workplace and at the site boundary; for example at the Bogorodchany site a monitoring report dated May 2014 and entitled “Conclusions on the monitoring of the sanitary technical conditions of Bogorodchany Gas Storage Site” reported noise measurements ranging from 50 to 99 dB (limit 60 and 80) with several

breaches of the limit. In general measurements indicate that the compressor house and boiler house should be considered as noise action areas.

Across all sites there was poor signage of designated noise areas and an absence of effective hearing protection in areas considered by the audit teams to require it.

On the Uherske site, wads of cotton wool were offered to the audit team as hearing protection to visit the compressor house which was considered inadequate even for short duration exposure. It was reported that those working regularly in the compressor house are provided with ear defenders but only one of the three operators was observed wearing them. In the November 2015 Sanitary Inspection report by the Authorities the site was given an improvement action to implement control measures to protect hearing by January 2016. Reportedly, the availability of ear defenders to compressor house staff was in response to this action.

The Bilche-Volytsko-Uherske facility had compressors emitting seemingly high noise levels to the immediate surroundings and no hearing protection was reportedly required. It was explained that any work outside the compressors took place for a short time.

The control room within the boilerhouse at Bogorodchany was acoustically enclosed but at the time of the audit an electrical lead propped a window open thereby negating the noise damping.

**ESAP item 2.6 has been defined to cover the recommendation that the sites review their management of noise exposure, PPE availability and enforcement. Risk Rating: Medium**

## VIBRATION

No concerns were reported or observed from health risks associated with vibration.

## HAZARDOUS MATERIALS

The following list of hazardous materials used on sites and their hazardous class was provided:

Material	Class	WSP PB Comment
Acetylene	4	Category 1 Flammable gas
Diesel fuel	4	Category 3 Flammable liquid
Diethylene glycol	3	Category 4 Acute Toxicity
Methane	4	Category 1 Flammable gas
Ethane	4	Category 1 Flammable gas
H-Butane	4	Category 1 Flammable gas
Propane	4	Category 1 Flammable gas
Hydrogen sulphide in mixture with hydrocarbons	3	Category 1 Flammable gas
Carbon dioxide	4	Not classified under GHS
Carbon monoxide	4	Category 1 Flammable gas
White spirit	4	Category 2 Flammable liquid
Sulphuric acid	No info provided	Category 1 Corrosive
Ethyl mercaptan	2	Category 1B Carcinogen
Surfactant Savenol	No info provided	

The main hazardous material on site is the methane gas from a major hazards fire/explosion perspective. There are also significant quantities of diesel, lubricating oils and diethylene glycol which present more of a land contamination issue if there were to be a loss of containment incident.

Methane levels are monitored using automatic static sensors (calibrated against methane) located at key points inside of the rooms.

- LAH reportedly set at 0.5% LEL
- LAHH reportedly set at 1.0% LEL

In addition the operator makes periodic methane measurements at pre-defined points inside and outside of the buildings during the shift using a portable gas monitor calibrated for methane.

**ESAP item 3.1(e) has been defined to cover that a review of systems, processes and equipment for storage facilities for oil, fuel and chemicals against applicable BAT requirements should be conducted. This should include bunding of storage tanks, containment of delivery areas, inspection programs for delivery hoses and underground pipework and improved spill response procedures and equipment. The storage tanks themselves appeared to be in reasonable condition, with the main issues being related to the integrity of the secondary containment systems as a number of the bunds showed physical deterioration which might reduce their effectiveness to contain a release if the primary containment failed. Risk Rating: Medium**

## OTHER PHYSICAL FACTORS: RADIATION EXPOSURE

No radioactive sources are known to be present in any of the facilities.

## OCCUPATIONAL HEALTH AND HYGIENE MONITORING

At the Bogorodchany site a workplace hygiene monitoring programme is in place and the site provided a copy of the 2014 report for review. The document was titled "Conclusions on the monitoring of the sanitary technical conditions of Bogorodchany Gas Storage Site". Key points from the report included:

- Noise – 50-99 dB (limit 60 and 80) – several cases of a breach in the limit
- Light – 100-260 Lux (limit 150, 200, 300, 400) - several cases of low light levels recorded
- Air – limits for acids, oil, dust, CO, NO, Mn – one breach for Mn in welding shop – 0.3 mg/m<sup>3</sup> (limit – 0.2)
- Radiation – 0.1-0.12 mcG/h (limit 0.44)
- Microclimate – temperature and turbidity are within the norms but air movement velocity is lower in several cases.

At the Uherske Gas Storage Site, health surveillance takes place. However, in the November 2015 Sanitary Inspection Report from the Authorities it was noted that only some of those who should have had a medical did and an action plan was required for the others.

At Uherske, it was noted that cooling tower systems are dosed with water softener and corrosion inhibitor, but that biocides are not added to the system. It is not known if Legionella testing is conducted on the systems.

**There are no regulatory requirements for Legionella control, however it is recommended that cooling tower management is reviewed to ensure that sufficient maintenance, biocidal dosing and testing is conducted to minimise the potential for Legionella. ESAP item 2.13 has been defined to cover the recommendation above. Risk Rating: Medium**

## FIRE AND EXPLOSION RISK MANAGEMENT

During the site visit it was reported by site personnel that fire and explosion risk assessments had been completed including a Hazardous Area Classification and "No ignition source" signage was observed at the entrance to specific buildings or rooms within buildings.

During the site induction at the Lviv Oparske site, the audit team were briefed that the whole site outside of the administration building was zoned and mobile phones were required to be switched off or left behind. However, whilst on the operating site it was observed that several Lvivtransgaz personnel accompanying the audit received and took calls on their mobile phones and it appeared that their phones remained switched on during the rest of the site walkaround.

**ESAP item 2.9 has been defined to cover the recommendation that a strict enforcement of the control of ignition sources and the carrying of non-intrinsically safe mobile phones on site should not be allowed at all. Risk Rating: Medium**

Fire response equipment was provided in the form of automatic fire suppression systems within specific buildings/rooms (e.g. CO<sub>2</sub> for the gas turbine compressor house at the Oparske site) and foam and powder extinguishers and fire hydrants were located around the sites.

The fire water system is maintained at 6-12 Bar Gauge (BarG) with lead lagging and redundant spare pumps. Sites typically hold a reservoir of fire fighting water in two storage tanks fed from the public water distribution system. At the Lviv Oparske site there was total capacity of 700 m<sup>3</sup> of stored fire water, additionally there were mobile foam cannons. At Uherske there are two 500m<sup>3</sup> fire water tanks supplying the site hydrant system which is maintained at 6 BarG, rising to 10 BarG in operation; 2 main pumps, 2 centrifugal variable speed pumps and a jockey pump. There are no sprinkler systems at the Uherske site. Fire response trucks are available for but are stored at an offsite location, approximately 17 km from the site. Site management reported that response time is approximately 15 minutes.

Fire extinguishers appear to be inspected and maintained regularly and all those inspected during the site walk arounds appeared to have valid dates.

The sites have their own fire appliances; state fire brigades will also respond and are included in training and drills.

A mixture of temperature, flame detection, smoke and methane is monitored using fixed sensors and also manually as per a preplanned schedule for specific buildings/rooms where there is a significant risk of build-up of a flammable atmosphere if a leak were to occur, e.g. natural gas compressor house. At Bilche-Volytsko-Uherske the oil/ ethylene glycol pumping room did not have fire or smoke detection; however, a fire extinguisher was available.

**ESAP item 2.9 has been defined to cover the recommendation that leak/ fume detection and/or fire/ smoke detection to be installed in ancillary buildings that house safety critical equipment, e.g. the oil/ ethylene glycol pump rooms which provide cooling to the gas compressors. Risk Rating: Medium**

In discussions with key site personnel it was reported that they maintain a list of explosion rated electrical equipment required for their site. Documentary evidence was provided by the following sites:

- Oparske: a list over 4 pages of about 800 pieces of equipment, including electrical drives, illuminators, buttons, pumps, electrical heaters, vents, oil units, valves, oil cleaning units.
- Bilche-Volytsko-Uherske: a list over 5 pages of about 300 pieces of equipment including those above plus compressors, air condensers, water treatment equipment, filters.
- Bogorodchany: 126 pieces of electrical drives and illuminators

## SITE ACCESS

All sites had 24/7 365 days per year security guard presence. Typically there is one security guard located at the main building/site entrance and others patrol the main site boundary.

- At the Oparske site, ten security guards work a twelve hour shifts, they are responsible for security within the internal perimeter. Reportedly, the State Security Service patrol the off-site well heads and pipelines.
- At the Uherske site, eight security guards work a twelve hour shifts, they are responsible for security within the internal perimeter. Four are employees and four are contractors. One is based in the office and the other carries out hourly patrols.
- At the Bogorodchany site, three contractor security guards are responsible for security within the internal perimeter and around the wells. One external (plus one internal) are based in the office with two patrols covering the perimeter fence and wells. Site management reported that their role is monitoring rather than defensive.

- At the Bilche-Volytsko-Uherske site, two security guards are responsible for security within the internal perimeter. One guard is based in the office with a patrol covering the perimeter fence and wells. Guards are a mixture of internal and contractor personnel.

At all sites the boundary had a physical barrier in the form of a concrete panel/ wire mesh fencing, with razor/barbed wire fitted on top of fencing at some. Some sites have closed-circuit television (CCTV) at the boundary and other sensitive parts of site are fitted with motion sensors. Some well heads are protected by mesh fencing.

**ESAP item 2.16 has been defined to cover the recommendation that all sites should consider upgrading to CCTV and/or motion sensors around the site boundary. Risk Rating: Low**

## LONE WORKING

It was reported that there was no lone working for high hazard operations such as hot work, confined entry etc. However, staff can be working alone in some workshop areas and a formal procedure for this is not available. There are currently no reporting arrangements to ensure the welfare of lone workers in all working areas and **it is recommended that one be put in place.**

## EMERGENCY PLANS

The emergency actions plans are extensive documents containing more than 200 pages each. Extracts from Oparske and Dashavske plans have been provided and are discussed below.

The structure of the table of contents and the format of the two example documents are similar. The difference relate to the technical facilities at the two underground gas storage sites. For Uherske, Bilche-Volytsko-Uherske, Bogorodchany the initial pages of these documents record information related to revision of the document, as well as a list of people involved and their actions.

The emergency 'events' considered for inclusion in the plan are defined in sub-section 1.2 (Analysis of hazards, possible accidents and their consequences), namely:

- Actual state of the equipment and pipes of the facility in question, its operational conditions
- Chemical and physical conditions of natural gas, petrol and diesel fuel
- Structural characteristics of the equipment which can cause hazards
- Values of parameters of injection, storing and withdrawal of natural gas and liquid fuel
- Location of the facility within the borders of settlement and region

In general the types of emergency events are split into three groups (sub-section 1.7):

- Group 1: occasional, beyond control (like storms, flood, high temperatures etc. and accidents on the neighbouring facilities )
- Group 2: dangerous deviation of pipeline and equipment parameters which can seldom be controlled (mechanical and corrosion wearing of metals and materials)
- Group 3: technological reasons causing violations of the process schedules

The main reasons for inclusion of these events appears to relate to accidents which took place in similar facilities are described in sub-section 1.7 as follows:

- In the compressor station the compression process of natural gas itself
- In the compressor stations and pipelines – parameters of gas (pressure, temperature)
- Parameters of process media –pressure and temperature of natural gas – causes danger of increase of consequences of hazard and logical schemes of occurrences of emergency situations in the different facilities of underground gas storage (Unit 1 – underground gas storage, Unit 2 – Gas collection station, Unit 3 – Gas drying unit, Unit 4 – Compressor shop 1, Unit 5 – Compressor shop2, Unit 6 – Storage of fuels and

lubrication materials), their causes and prevention and localization plans are presented in sub-section 1.10. This sub-section contains equipment hazard chart for each unit.

The plan contains, amongst other items:

- Specific roles and responsibilities in case of an emergency event (table 2.25), list of people involved in the emergency prevention actions and their roles (responsibilities) (sub-sections 2.1.9 – 2.1.12, 2.1.16 for emergency situations “A”, “B”; sub-section 2.2.1, 2.2.14, 2.2.15 for emergency situations “B”)
- Instructions for on site staff to gain access to dedicated emergency refuges or ‘safe rooms’ / areas (sub-section 2.2.6).
- Whether there is an on site emergency services team in place / reference (sub-sections 2.1.12, 2.2.1, 2.2.7)
- Liaison with off site emergency services (sub-sections 2.2.2, 2.2.3, 2.2.4).
- Details of any off site emergency planning required (i.e. with local communities) – sub-sections 2.2.8, 2.2.9

Through interview of the Dispatch Operator and from a review of the extracts provided it would appear that the emergency plans are focused on major process incidents involving large scale loss of containment and are very prescriptive as to the steps to be taken for each defined scenario.

**ESAP item 2.14 has been defined to cover the recommendation that the plan should demonstrate that all types of probable emergency scenarios have been considered for inclusion and a risk based approach used to determine which should be included in the plan. Areas for consideration should include major injuries and health effects, major property damage above an established cost base, major environmental damage, fire, flood and storm, bomb threats, sabotage, etc. Risk Rating: Low**

In the event of an emergency the Dispatch Operator is required to lookup the scenario in the manual for the required actions. However, this did not appear to be practical in a real incident.

**ESAP item 2.15 has been defined to cover the recommendation that a simplified version of the emergency plan and steps should be made available for operators to access swiftly in the event of an incident. Risk Rating: Low**

The Dispatch Operator reported, and it was observed during the walk round of the control room, that there is an emergency stop button which shuts down the whole operation. Reportedly, it is the responsibility of the Dispatch Operator to decide the potential severity level of incident and when to escalate up the management hierarchy.

## PLANT SAFETY MAINTENANCE AND INSPECTION

During the interviews at all sites, it was reported that the vessels and pipework carrying natural gas undergo ultrasonic thickness testing and 100% X-ray weld testing prior to installation. Hydraulic testing is conducted at 150% maximum working pressure for 24 hours, followed by 125% for 3 days once installation complete.

From the interviews with site personnel, Planned Maintenance and Inspection programmes appear to be in place for electrical systems, vessels, pipework and compressors, for example:

- Vessels and pipework – visual and ultrasonic thickness testing is conducted. Corrosion monitoring of pipes is carried out by an external agency every 5 years. Pressure vessels, e.g. at Oparske, the driers (56 BarG) are inspected every 4 years and every 8<sup>th</sup> year hydraulically with water as well as ultrasonic wall thickness measurement. The results of the thickness measurements are compared with previous years and used to set the ongoing maximum operating pressure for the vessel; if there is greater than 25% loss in wall thickness the equipment is decommissioned and replaced. Underground pipes are bitumen coated to provide external corrosion protection. A similar description was provided at the Uherske site.

At the Oparske site, a sacrificial cathodic protection system was also observed to be installed to reduce the effects of external corrosion.

- Compressor maintenance is based on running hours and other equipment is on fixed time periods.
- Electrical, earth bonding and lightning protection systems are under periodic inspection and testing by competent electrical person(s). At the Oparske site, it was reported that fixed electrical wiring in Ex rated areas is visually inspected once per week and tested every 4<sup>th</sup> month; earthing and lightning protection systems are tested annually by an external specialist contractor according to the National Standard. At the Uherske site, the non-Ex rated fixed wiring systems (400 and 600 V ac) are tested annually by an external agency (DR Testing) and was last done in August 2015; the site Electrician is licensed to work on certificate Ex rated fixed wiring systems; earthing and lightning protection systems are tested by the same external agency (sample of results reviewed indicated resistance less than 0.1 Ohms which is acceptable).
- Pressure Relief is under a formal maintenance and testing regime. Reportedly, At the Uherske site, the Chief Engineer reported that Pressure Relief Valves are tested for lifting pressure when removed before undergoing mechanical maintenance and refitting.
- At the Uherske site, the boilers are inspected and tested annually for combustion efficiency and emissions.
- Fire detection and response equipment undergoes periodic inspection and testing,

The following sample documentation was requested from the site in order to verify implementation of the described PPM programmes:

- Uherske
  - 2015 Inspection and testing report for fire detection system. Not yet received for review
  - 2015 Inspection and testing report for Fire suppression and response equipment. Not yet received for review.
- Bilche-Volysto-Uherske
  - Most recent testing records for crane in compressor house.
    - Results of technical test N 24746520-09-028.1-0003-14 dated 10.02.14 and valid till 05.02.19 for the travelling (bridge) crane with maximum load 2t. 12 pages with information on actual tests was provided.
- Bogorodchany
  - 2014 testing and inspection report for cranes on site. No report was found.
  - Underground storage tank testing reports (2008).
    - Protocols of testing N 1244 dated 18.07.08 for the tank E1 and N 1245 dated 22.07.08 for the tank E2 by ultrasonic defectoscope. No conclusions are found.
    - The first tank was checked in 39 points at the site and 15 points for the bottom. The results are: 11.4-12.5 mm at the site and 14.6-15.9 mm at the bottom.
    - The second tank was checked in 34 points at the site and 15 points for the bottom. The results are: 14.3-15.9 mm at the site and 14.0-15.9 mm at the bottom.
    - Besides, the same tanks were checked by visually and by optic methods with the help of 6-time magnifier, beam compass (trammel) and universal profile templet.  
Conclusion: no defects

## 8

## SOCIAL PERFORMANCE

## 8.1

## COMMUNITY HEALTH, SAFETY AND SECURITY

The management of health and safety risks to the public from incidents such as fire and explosion and from control of site access are described in detail in Sections 5 and 7.

In summary with respect to security, the company uses security guards, who can be either direct employees or subcontractors of the company, to protect entry to any workplace. This includes the administrative buildings in Kiev and the gas storage sites. Security personnel are generally armed with non-lethal weapons such as sprays. Video surveillance is in place for some, but not all facilities. Non-electric fencing is in place at all gas storage facilities.

Security activities are also occasionally performed jointly with the Ministry of the Interior, who might be armed with guns. Subcontracts are placed with the State security service to monitor offsite assets such as well heads at sites including Oparske and Dashavske.

## SANITARY PROTECTION ZONES

Each of the sites is surrounded by a 1 km sanitary protection zone, in which development is controlled to prevent damage to gas infrastructure and minimise risks to third parties conducting activities in the zone. The exception to this is Uherske, where the SPZ was officially reduced by the government to a minimum of 528 m following associated studies to demonstrate compliance with emissions requirements at the edge of the reduced zone.

Land in the sanitary protection zone is, at most sites, owned by the local community and used for agricultural purposes. Non-agricultural activities in the sanitary zone must be authorised by Ukrtransgaz and regular security patrols are utilised to monitor the areas for unauthorised activities. Wells within the sanitary protection zones are fenced and, the land within these fences is owned by Ukrtransgaz.

There are no residential buildings within the SPZ for Dashavske or Uherske.

At Oparske, the nearest off-site buildings are approximately 300 m to the south-east and appear industrial in nature, with another small single building, possible for residential use, approximately 600 m to the south-west.

At Bogorodchany, the nearest residence, part of the village of Sadzhava is approximately 600 to 700 m north-west of the site. There is also a small single building of unknown use approximately 400 m to the east of the site.

At Bilche-Volytsko-Uherske, there is a collection of buildings, appearing industrial in nature approximately 700 m to the south-east and sharing an access road to the site. The nearest known residence is greater than 1 km from the site.

Although there do appear to be a limited number of buildings of a residential nature within the SPZ of the facilities above, the audit reviewed any instructions / interventions by regulators for the facilities and none are reported. It is WSP PBs experience that SPZs that are set for all types of industrial facilities in Ukraine are often breached i.e., housing has been developed in this zone during historical periods. It is also our experience that this doesn't necessarily represent a concern for regulators, however, to ensure this is thoroughly checked, WSP PB is continuing to follow-up with the auditee in this regard.

The nearest building is between 300 m to 400 m from a site. To provide some context for this, in the UK, the planning authority and Health and Safety Executive in their approach to land use planning considers the risk of failure of a geological cavity in an underground storage facility as negligible with the risk more dominated by a release from the well connecting the storage cavity to the surface. For such sites in the UK consultation zones (similar to sanitary protection zones in

limiting residential development in some way) based on the impact of credible incidents would restrict development within the vicinity of the site. The extent of consultation zones for different hazardous sites vary considerably but for a site holding large scale flammable liquids, for example, the zones wouldn't typically extend further than 400m.

## 8.2 STAKEHOLDER DIALOGUE

### STAKEHOLDER ENGAGEMENT

Naftogaz issues an annual report. The 2014 report is available on the Naftogaz website and includes a section on corporate, social and environmental responsibility. Naftogaz also described that they issue coverage of environmental activities in the media and present environmental activities in international and national conferences and exhibitions. The OVNS for the recent Emergency Pipeline Upgrade and Modernization project was found online as part of this review, confirming the comment by Naftogaz that this had been placed online.

At Ukrtransgaz, there is a documents section on the company website<sup>4</sup>. Further information such as news and financial reports are also available on the website. There is a specific link for public information access<sup>5</sup>. This web page includes a description of the type of information available, which includes anything required to be made public by the Law of Ukraine on Access to Public Information, including any information that was obtained or created in the course of public authorities executing their duties. The website provides details of how to submit a request, including a postal, email, fax and telephone options.

Ukrtransgaz described its stakeholders as: representatives of enterprises and contractors, specialists of the gas transportation and energy industries, journalists, representatives of state authorities, representatives of regulatory bodies, company's employees, students and pupils, pensioners and veterans of the company and industry, citizens of Ukraine, representatives of international companies and organizations, and diplomats. The organisation's current practices and procedures for directly communicating with communities affected by its operations and other stakeholders include:

- The Corporate Portal<sup>6</sup> (internal communications, employees of the company);
- Magazine "Pipeline transportation"<sup>7</sup> (aimed at all types of stakeholders, especially gas transmission specialists and energy industries, journalists, company employees, retirees and veterans of the company and industry); and
- Press trips (journalists, representatives of international companies and organizations, diplomats), press conferences and guided tours and presentations (students and pupils).

Other stakeholder consultation processes are largely structured around statutory obligations to notify persons who could be affected by operations, development and maintenance at the site and associated wells, pipelines, etc.

Ukrtransgaz processes are applied by Lvivtransgaz and Prykarpatttransgaz at the site level.

At the design stage of significant development, a notification is placed in local newspapers informing the public of the proposal and requesting comments. Ukrtransgaz reported that very few responses are generally received to these notices.

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<sup>4</sup> <http://utg.ua/utg/about-company/docs>

<sup>5</sup> <http://utg.ua/utg/media/public-info-access.html>

<sup>6</sup> <https://portal.utg.ua/>

<sup>7</sup> <http://utg.ua/utg/media/tt-journal.html>

It was noted that information is made public, directly to communities, on the planned location and nature of off-site activities, such as well head or pipeline works and that public reporting on performance against permitted emissions is also required.

At each site, a fixed time each week is assigned when the plant manager is available to answer queries from both internal and external stakeholders. A notice displayed at the site boundary provides details of this process and the relevant times. However, most queries received are related to business and employment opportunities, and no EHS discussions were reported to have been received. Discussions are recorded in the site journal.

A specific stakeholder engagement plan is not currently in place, for example, one that highlights specific methods for identification and engagement of any vulnerable groups.

**ESAP item 1.3 has been defined to cover that communication programmes should be expanded to include stakeholder engagement programme compliant with IFC PS1. Risk Rating: Medium**

### COMPLAINTS AND GRIEVANCES

At Naftogaz, it was reported that grievances are dealt with in line with legislation, which includes an official record being made of any complaint received from the public and assigning of responsibility to prepare a response to the complaint. The Ukrtransgaz website includes a page<sup>8</sup> where you can type a message, request or complaint directly to the President of Ukrtransgaz.

It was reported by both Naftogaz and Ukrtransgaz that no public complaints, adverse media coverage or non-governmental organisation (NGO) campaigns on environmental or social matters had been received in the last five years.

Company telephone numbers to be used for complaints are publicised. No environmental complaints are reported to have been received by Ukrtransgaz from any of their project activities that have been subject to site visit.

A grievance mechanism is in place for employees, which describes that complaints can be filed in writing and addressed in the terms established by the Law of Ukraine, including on the solution of labour disputes. Every worker has the right to appeal to the leadership of the Company with any question, including a complaint related to a workplace concern. Complaints are recorded and processed by internal experts and the employee is given a written response. It was also noted that there is a comment box that could be a mechanism for anonymous grievances. All employees are also reported to be able to discuss their grievances with their Managers.

Despite this mechanism being in place, no grievances have been received from employees during the last three years.

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<sup>8</sup> <http://utg.ua/utg/media/chairman-column/message-to-president.html>

# 9 CONCLUSIONS AND RECOMMENDATIONS

## 9.1 OVERALL CONCLUSIONS

The audit and assessment has demonstrated that the company generally has a good awareness of risks associated with their activities. The audit has also identified where there are opportunities for the company to improve their EHSS performance, which have been summarised in the ESAP, in Appendix B.

Areas for general improvement include, but are not limited to, implementation of certified management systems at the Naftogaz level, and the need for planning and action around implementation of BAT. There is also opportunity for improvement with regard to meaningful consultation with stakeholders.

## 9.2 SUMMARY AGAINST IFC PERFORMANCE STANDARDS

### INTRODUCTION

The environmental and social appraisal has been conducted against IFC Performance Standards, as presented in the previous chapters. A high level summary of the project against the performance standards is provided in Table 9-3 overleaf in a compliance summary table.

Consideration of compliance with national legislation, international conventions, EHS General Guidelines and IFC Sector Guidelines is inherent in the review. For example, BAT from the sector guidelines is considered in the review of compliance with PS 3 Resource Efficiency and Pollution Prevention.

The following PSs are applicable:

- Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts
- Performance Standard 2: Labor and Working Conditions
- Performance Standard 3: Resource Efficiency and Pollution Prevention
- Performance Standard 4: Community Health, Safety, and Security
- Performance Standard 5: Land Acquisition and Involuntary Resettlement
- Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources
- Performance Standard 8: Cultural Heritage

This review of compliance is also intended to capture the requirements of OPICs Environmental and Social Policy Statement. Where specific topics are raised in the policy statement, for example, the need for an environmental and social management system, the associated PS, in this instance PS1, includes commentary on that topic.

The details in the compliance table will provide a baseline against which to judge future performance of the project through any annual environmental and social reporting process that is undertaken by Goldman Sachs or OPIC.

### COMPLIANCE SUMMARY GUIDANCE

For all PSs (Indicators with whole number references) a summary of overall compliance with the PS has been provided.

For each key performance indicator (KPI) within a PS, 4 steps have been completed as below:

1. *Decide whether the indicator is applicable.* The starting point is that all indicators are applicable unless the project has no significant aspects relevant to the indicator (i.e. no risks), in which case the indicator is scored Not Applicable (N/A) and a brief summary of the reason given.
2. *Decide whether an opinion is possible.* If not (for example if the indicator will apply, but it is too early to know) the indicator is scored as No Opinion Possible (NOP) and a brief summary of why provided. Where lack of opinion represents a material omission to the review, a reference is made to where this is addressed in the report and any recommendations summarised.
3. *Score the indicator as follows and provide brief justification.*

**Table 9-1 Indicator Scoring**

<b>EC</b>	<b>Exceeding Compliance</b> The project has gone beyond the expectations of the PS requirements. Goldman Sachs and OPIC should be able to use projects rated EC as a role model for positive Environmental and Social effects.
<b>FC</b>	<b>Fully Compliant:</b> The project is fully in compliance with PS requirements, and national environmental, health and safety policies and guidelines.
<b>PC</b>	<b>Partial Compliance:</b> The project is not in full compliance with PS requirements, but has systems, processes or mitigation measure in place which are working towards addressing the deficiencies.
<b>MN</b>	<b>Material Non-compliance:</b> The project is not in material compliance with PS requirements, and the systems, processes and mitigation measures in place are not working towards addressing the deficiencies.

4. *Actions Required: Where applicable, briefly describe any actions required by the client to achieve full compliance with each requirement. Where a relevant action is included in the ESAP for this project, provide a reference to the ESAP.*

Table 9-2 below illustrates the approach to be taken.

**Table 9-2 Risk / Confidence**

<b>Risk</b>	<b>High</b>	<b>PC</b>	<b>MN</b>	<b>MN</b>
	<b>Medium</b>	<b>PC</b>	<b>PC</b>	<b>MN</b>
	<b>Low</b>	<b>FC</b>	<b>PC</b>	<b>PC</b>
		<b>High</b>	<b>Medium</b>	<b>Low</b>
<b>Confidence</b>				

Table 9-3 Summary of IFC Performance Standards for the Project

KPI REF.	PERFORMANCE STANDARD	SCORE	COMMENTS / ISSUES	ACTIONS REQUIRED	ESAP REF.
<b>IFC PS 1</b>	<b>ASSESSMENT AND MANAGEMENT OF ENVIRONMENTAL AND SOCIAL RISKS AND IMPACTS</b>				
	<b>Summary:</b>				
	The main action is the update of the ESMS to comply with PS1. Original EIAs were not available for this review. In addition to the key action areas below OPIC will continue to assess any additional external reporting needs for the project.				
1.1	<b>Environmental and Social Assessment</b>	PC	<p>Naftogaz has not made a specific assessment of the environmental and social impacts of its overall operations, but does report that environmental impact assessment is carried out in accordance with the applicable national legislation for specific projects. This includes an EIA for the construction of the stage II Metrological Centre in Boyarka.</p> <p>Ukrtransgaz also reports to perform assessments in accordance with national legislation. Ukrtransgaz directly lead on the early stages of development of a new project. This was confirmed on site where staff frequently referred to plans for new developments or equipment originating at the Ukrtransgaz level.</p> <p>EIA documents were requested as part of this review; however, an example was not provided.</p> <p>The existing environmental assessment system in Ukraine is more compliance-based requiring regulatory requirements and approval procedures to be fully met whilst international best practice focuses more on risk mitigation, including specifying mitigation to be employed, and expands on the social and economic component of the assessment.</p> <p>Specific assessment of health and safety risk is addressed in PS4 below.</p>	Develop Company's standard and procedures on impact assessment, including land acquisition, community impacts, and cultural heritage, in line with IFC PS1.	1.2
1.2	<b>Environmental and Social Management Systems (ESMS), Environmental and Social Policy</b>	PC	<p>Naftogaz has an integrated management system (IMS) incorporating quality, environment and H&amp;S. None of the elements of the system are currently certified. Naftogaz stated that the management system components for H&amp;S and Social Accountability are compliant with OHSAS18001 and SA8000 respectively. Environmental (e.g. ISO14001) and Quality (e.g. ISO9001) systems are in development,</p>	Naftogaz to continue to develop its integrated EHSS management system to achieve compliance with requirements of IFC Performance Standards	1.1

KPI REF.	PERFORMANCE STANDARD	SCORE	COMMENTS / ISSUES	ACTIONS REQUIRED	ESAP REF.
			<p>with plans for certification of the quality management system. Naftogaz currently has no plans for ISO50001 (Energy) or AA1000 (Corporate Responsibility) components of the system.</p> <p>Naftogaz reported that they plan to develop a new regulatory document on OSH management at the Company, subject to the provisions of the national standard of Ukraine DUST OHSAS 18001: 2010 and international best practices for managing occupational safety and health ("Seven Golden Rules", "Zero Accident - Zero Injuries at Work").</p> <p>HR procedures were reported to be in line with International Labour Organisation (ILO) conventions.</p> <p>Ukrtransgaz also has an integrated management system incorporating quality, environment and H&amp;S and incorporating all regional activities such as those of Lvivtransgaz. The system is certified to OHSAS18001 (Health and Safety), ISO14001 (Environment), ISO50001 (Energy), and ISO9001 (Quality). Ukrtransgaz currently has no plans for specific Social Accountability (e.g., SA8000) or AA1000 (Corporate Responsibility) components of the system.</p>		
1.3	Identification of Risks and Impacts		Refer to KPI Ref 1.1 above.	Refer to KPI Ref 1.1 above.	-
1.4	Environmental and Social Management Plan / Programmes	PC	<p>Naftogaz reported they have an existing action plan covering environmental management, health and safety management, and human resources management. A copy of the environment plan was available for this review.</p> <p>Naftogaz also noted the actions they are committed to in response to the 2015 ESAP from EBRD, related to that separate due diligence exercise, and have provided a copy of that ESAP as part of this review.</p> <p>Ukrtransgaz reported they have an existing, budgeted, action plan covering environmental, health and safety, human resources, and communications management. However, it was not provided for review. Ukrtransgaz is</p>	A number of KPI Refs address requirements here, including but not limited to 1.1 and 1.2.	-

KPI REF.	PERFORMANCE STANDARD	SCORE	COMMENTS / ISSUES	ACTIONS REQUIRED	ESAP REF.
			<p>also aware of the requirements described in the 2014 and 2015 ESAPs from EBRD, related to the two separate EBRD due diligences.</p> <p>During site visits it was described that changes such as new equipment or plans are initiated at the corporate level by Ukrtransgaz as is budget allocation. Actions plans were provided for 4 of the 5 sites.</p> <p><b>Actions from the 2014 EBRD ESAP have been utilised where they are considered appropriate in this report as they are agreed to and underway within the company.</b></p>		
1.5	<b>Organisational Capacity, Commitment and Competency</b>	PC	<p>The Company has a management structure established for EHSS. The Company does not generally rely on external experts for environmental and social issues; it has its own specialists.</p> <p>Naftogaz reported undertaking routine employee training on environment, health and safety, but not on human resources management.</p> <p>Ukrtransgaz reported undertaking routine employee training on environment and health and safety, but not on human resources management, though training on labour protection for workers is held in accordance with approved plans and programs for technical staff every three years. The training plan for the management team and an example record of training was not available for review.</p>	As part of the development of the ESMS clearly define a training programme.	1.1
1.6	<b>Project Monitoring, Reporting<sup>9</sup> and Review</b>	PC	A system of inspections / audits at each site and by both Naftogaz and Ukrtransgaz has been established aligned to national legal requirements. Facilities also receive regular inspections by regulators.	Refer to KPI Ref 1.2.	-

<sup>9</sup> At appraisal stage there will be limited information. Compliance assessment should address specific plans for monitoring and reporting (against for example ESAP requirements) and also consider whether there is evidence of weak monitoring/reporting by client on other relevant projects - which may reduce confidence in future performance.

KPI REF.	PERFORMANCE STANDARD	SCORE	COMMENTS / ISSUES	ACTIONS REQUIRED	ESAP REF.
			<p>Naftogaz has received 16 inspections from environmental authorities in the past five years, the most recent in July 2015. Ukrtransgaz has received 40 in the same period of time, with the most recent also in July 2015. These have resulted in 300,000 UAH of fines (in the order of 11-12,000 USD) for Ukrtransgaz. These fines and associated proceedings by the State Environmental Inspectorate were reported to focus on the late receipt of permits (including those associated with changes in legislation) and the excess emissions resulting from accidents at gas pipelines (not in the scope of this review). No operations have been suspended or closed down due to environmental reasons and all are currently reported to be operating in compliance with permits. No notices of non-compliance have been received from authorities in the last 5 years. However, some opportunities for improvement have been communicated by the regulators following inspections.</p> <p>Current reporting of project performance against the full range of EHSS requirements is performed for regulators.</p>		
1.7	<b>Stakeholder Engagement, External Communications and Grievance Mechanisms</b>	PC	<p>The Company communicates externally through a variety of means including its website.</p> <p>Local stakeholder consultation processes are largely structured around statutory obligations to notify persons who could be affected by operations, development and maintenance at the site and associated wells, pipelines, etc.</p> <p>Each year the company also meets with the council of the local villages to describe the planned works in the area.</p> <p>At each site, a fixed time each week is assigned when the plant manager is available to answer queries from both internal and external stakeholders. A notice displayed at the site boundary provides details of this process and the relevant times. However, most queries received are related to business and employment opportunities, and no EHSS discussions were reported to have been received. Discussions are recorded in the site journal.</p>	Expand Company's communication programme to include a stakeholder engagement programme compliant with IFC PS1	1.3

KPI REF.	PERFORMANCE STANDARD	SCORE	COMMENTS / ISSUES	ACTIONS REQUIRED	ESAP REF.
			A specific stakeholder engagement plan is not currently in place, for example, one that highlights specific methods for identification and engagement of any vulnerable groups or formally documents a grievance mechanism for the community.		
<b>IFC PS 2</b>	<b>LABOR AND WORKING CONDITIONS (OCCUPATIONAL HEALTH AND SAFETY)</b>				
	<b>Summary:</b>				
	A number of actions areas have been identified where gaps have been identified in this review.				
<b>2.1</b>	<b>Occupational Health and Safety</b>	<b>PC</b>	Overall, mechanisms are in place to provide a safe and healthy working environment. However, a few specific issues have been identified.	It is recommended that an Occupational Health & Safety Management system consistent with OHSAS 18001 is implemented.	2.1
			Generally, the provision of health and safety training was in place. However, the training delivered at the Bogorodchany site within the Ivano-Frankivsk region was more limited.	It is recommended that the training plan at the Bogorodchany site is reviewed to include refresher and safety orientated training.	2.2
			Focus is mainly on physical injury and not on the acute effects of long term exposure to, for instance noise (Regulators highlighted that staff were exposed to high levels on noise on the Uherske site).	It is recommended that the safety culture is improved and Accident/Incident/Near miss reporting should be encouraged rather than penalised.	2.3
			There is a formal permit to work system in place. However, based on interviews there is no current system of Permit To Work (PTW) auditing and during the site walkovers there were a number of instances where activities under a PTW didn't appear to have the appropriate controls in place (see examples provided in Contractor section below).	It is recommended that audits of the use of the PTW system are conducted to ensure appropriate controls are being used.	2.4
			On the face of it, the internal audit programme appears to be comprehensive but clearly the key findings raised by the Regulator in November at Uherske (water & noise) should have been captured earlier.	It is recommended that the internal audit scope and methodology is reviewed.	2.5
			PPE including suitable hearing protection was not always available in the work areas. On some occasions operators	It is recommended that the sites review their management of noise	2.6

KPI REF.	PERFORMANCE STANDARD	SCORE	COMMENTS / ISSUES	ACTIONS REQUIRED	ESAP REF.
			were not wearing hearing protection.	exposure, PPE usage, availability and enforcement.	
			Lifting limits were not always displayed on the beam crane should be signed with the maximum weight limit.	It is recommended that all lifting equipment it marked with its safe working load.	2.12
			Directional signage for evacuation routes was mainly limited to administration buildings. There was no assembly area signage observed a limited number of signs showing a directional arrow, mostly containing text. Very limited use of hazard signage was observed and there was use of non-standard signage in some areas.	It is recommended that a full survey of all sites is carried out to identify the required safety signage as well as the condition and adequacy of current signage.	2.7
			Mobile phones were required to be switched off or left behind for site tours. However, whilst on the operating site it was observed that several Lvivtransgaz personnel received and took calls on their mobile phones and it appeared that their phones remained switched on during the rest of the site walkaround.	Recommend a strict enforcement of the control of ignition sources and the carrying of non-intrinsically safe mobile phones on site should not be allowed at all.	2.8
			A mixture of temperature, flame detection, smoke and methane is monitored using fixed sensors and also manually as per a preplanned schedule for specific buildings/rooms where there is a significant risk of build-up of a flammable atmosphere if a leak were to occur. At Bilche-Volytsko-Uherske the oil/ ethylene glycol pumping room did not have fire or smoke detection.	It is recommended that leak/ fume detection and fire/ smoke detection to be installed in ancillary buildings that house safety critical equipment.	2.9
2.2	<b>Infrastructure, Building, and Equipment Design and Safety</b>	PC	Risk assessment is used to identify actions to minimise hazards.	It is recommended that the sites adopt and implement internationally recognised risk assessment methodologies, HAZID and HAZOP for: New plant and process introduction; Significant changes to existing plant and process; Management of Change and incorporate organisational change in scope.	2.10
			Most walkways and handrails were in adequate condition taking into account age and environment. However, access	It is recommended that a programme of inspections of access	2.11

KPI REF.	PERFORMANCE STANDARD	SCORE	COMMENTS / ISSUES	ACTIONS REQUIRED	ESAP REF.
			gantries and walkways were rusted and in poor condition in some locations, e.g. tank access platforms at Bilche-Volytsko-Uherske.	platforms is conducted and any necessary repairs / replacements made.	
2.3	<b>Hazardous Materials Management and Safety</b>	PC	The main hazardous material on site is the methane gas from a major hazards fire/explosion perspective. There are also significant quantities of diesel, lubricating oils and diethylene glycol which present more of a land contamination issue if there were to be a loss of containment incident.	Refer to Action 3.1(e) above	3.1(e)
2.4	<b>Workers Exposure to disease</b>	PC	At Uherske, it was noted that cooling tower systems are dosed with water softener and corrosion inhibitor, but that biocides are not added to the system. It is not known if Legionella testing is conducted on the systems.	It is recommended that cooling tower management is reviewed to ensure that sufficient maintenance, biocidal dosing and testing is conducted to minimise the potential for Legionella.	2.13
2.5	<b>Emergency Preparedness and Response</b>	PC	Emergency plans appear to focus on major process incidents involving large scale loss of containment and are very prescriptive as to the steps to be taken for each defined scenario.	It is recommended that the plan should demonstrate that all types of probable emergency scenarios have been addressed. Areas for consideration should include major injuries and health effects, major environmental damage, fire, flood and storm.	2.14
			In the event of an emergency, the Despatch Operator is required to lookup the scenario in the manual for the required actions. However, this did not appear to be practical in a real incident.	It is recommended that a simplified version of the emergency plan and steps should be made available for operators to access swiftly in the event of an incident.	2.15
2.6	<b>Security Personnel Requirements</b>	PC	The company uses security guards, who can be either direct employees or subcontractors of the company, to protect entry to any workplace. This includes the administrative buildings in Kiev and the gas storage sites. Security personnel are generally armed with non-lethal weapons such as sprays. Non-electric fencing is in place at all gas storage facilities. The company reported that security staff are trained for the position.	Refer to Section 1.2 above.	1.1

KPI REF.	PERFORMANCE STANDARD	SCORE	COMMENTS / ISSUES	ACTIONS REQUIRED	ESAP REF.
			<p>Security activities are also occasionally performed jointly with the Ministry of the Interior, who might be armed with guns. Subcontracts are placed with the State security service to monitor offsite assets such as well heads at sites including Oparske and Dashavske.</p> <p>The only potential non-compliance is training within the primary supply chain i.e., the contracted security personnel. The specific training received is unknown; however, it was described as being in accordance with national regulations and includes the use of weapons.</p>		
<b>IFC PS 3</b>	<b>RESOURCE EFFICIENCY AND POLLUTION PREVENTION</b>				
	<b>Summary:</b>				
	A number of action areas have been listed below where gaps have been identified by this review.				
<b>3.1</b>	<b>Resource Efficiency</b>	PC	<p>CO2 generation data provided by Naftogaz indicates that generation across the business exceeds the 100,000 ton threshold specified in the IFC Sector Guidance for Onshore Oil &amp; Gas Development. Quantification of emissions has been conducted but it is not known if this has been done in accordance with internationally recognized methodologies and reporting procedures.</p>	<p>Confirm that internationally recognized methodologies and reporting procedures have been used for quantification of emissions.</p> <p>An assessment of direct greenhouse gas emissions is being provided under separate cover for submission to OPIC.</p>	3.1(b)
			<p>Recirculation of oils and glycol within the processes is undertaken where possible. Where this is not possible, waste is disposed using licensed contractors.</p>	<p>No actions</p>	-
<b>3.2</b>	<b>Pollution Prevention and Control - Air emissions</b>	PC	<p>Equipment at the facilities is operational, and has been so for considerable periods of time, and therefore is unlikely to comply with all specifications of the guidelines.</p> <p>However, management practices observed during site inspections appear to be effective in reducing fugitive emissions to a standard that would meet BAT requirements.</p> <p>The Company reported and our assessment showed that that discharges to air are in compliance with site permits and local standards, where these are set. Where</p>	<p>Conduct a review of the control of the combustion units to ensure that NOx is minimised as far as practicable, in particular through reviewing the air feed to ensure that excessive NOx is not being produced as a result of high air feed</p>	3.1(a)

KPI REF.	PERFORMANCE STANDARD	SCORE	COMMENTS / ISSUES	ACTIONS REQUIRED	ESAP REF.
			<p>exceedences have been identified, these have been authorised by the regulators, and improvement programmes have been established to reduce emissions by 2018.</p> <p>However, as the Ukrianian permitted emissions levels are significantly higher than the IFC Guideline values, it is unlikely that the IFC Guidelines are consistently complied with, and the sample monitoring data reviewed supports this conclusion. However, these are small combustion sources (between 6 to 16MWth) and this scale of combustion unit is not of a level to cause concerns in relation to ambient air quality. For example, in an EU context, these combustion units would not be permitted for their emissions under current regulatory regimes (which are applicale above 50 MW) and therefore this aspect is considered LOW RISK.</p> <p>However, a recommendation has been proposed for best practice purposes only.</p>		
3.3	Pollution Prevention and Control - Wastewaters	PC	<p>Separate drainage systems are present at most facilities. Where combined drainage is present, this discharges either to sewer, or via treatment systems. However, detailed drainage maps were not provided so a full assessment of drainage systems could not be completed.</p> <p>Separators and other treatment plants are older and unlikely to meet all BAT requirements. Maintenance regimes for systems are unlikely to meet BAT requirements.</p> <p>At several sites, wastewater and runoff is held in in-ground pits prior to treatment. It is not known if the ponds / lagoons are of sufficient integrity to retain effluent and/or are situated in a sensitive aquifer.</p>	Conduct a review of management systems, operational & maintenance processes and equipment for management of wastewater, stormwater and other water discharges against applicable BAT requirements.	3.1(c)
			<p>Information provided indicates that discharges are in compliance with site permits and local standards. However, concentrations of some non-permitted parameters (especially methanol and glycol) in some</p>	Review discharges of wastewater to identify potential sources of methanol and glycol recorded in sampling. Review concentrations of	3.1(d)

KPI REF.	PERFORMANCE STANDARD	SCORE	COMMENTS / ISSUES	ACTIONS REQUIRED	ESAP REF.
			samples appear high and no comparison with appropriate standards is known to have been conducted.	methanol and glycol in discharges against appropriate international guidelines.	
3.4	<b>Pollution Prevention and Control Land</b>	PC	<p>No contaminated land site investigations are known to have been conducted at any of the sites, and there is no known regulatory driver for these at present.</p> <p>No specific evidence of releases to soil and/or groundwater (e.g. staining of surfaces, pooled oils or leaking pipes) were noted during the site inspections and management reported that no significant spills or other releases have occurred.</p> <p>However, given the age of the facilities (with a long history of oil &amp; fuel storage and compressor operation involving oils),, and the condition of fuel and chemical storages, particularly with regards to inadequate bunding, and the lack of containment around fuel offloading areas, there is a high potential for soil and/or groundwater contamination to be present in parts of all the sites.</p>	Completion of appropriate site investigations to determine the baseline soil and groundwater conditions below the sites.	3.2
3.5	<b>Greenhouse Gases<sup>10</sup></b>	PC	CO2 generation data provided by Naftogaz indicates that generation across the business exceeds the 100,000 ton threshold specified in the IFC Sector Guidance for Onshore Oil & Gas Development. Quantification of emissions has been conducted but it is not known if this has been done in accordance with internationally recognized methodologies and reporting procedures.	<p>Confirm that internationally recognized methodologies and reporting procedures have been used for quantification of emissions.</p> <p>An assessment of direct greenhouse gas emissions is being provided under separate cover for submission to OPIC.</p>	3.1(b)
3.6	<b>Water</b>	FC	Naftogaz reported that the main sources of water for the organisation are groundwater wells, surface water abstractions and municipal mains water supply. Water is	No actions required.	

<sup>10</sup> Particular attention should be given to client demonstration of consideration of alternatives. Projects expected annually to produce more than 25,000 tonnes of Co2 equivalent should provide an emission inventory and plans for annual reporting.

KPI REF.	PERFORMANCE STANDARD	SCORE	COMMENTS / ISSUES	ACTIONS REQUIRED	ESAP REF.
			<p>treated prior to use, with physical and/or chemical treatment according to the technological regulations.</p> <p>The use of water from underground sources and surface water is carried out in accordance with permits. Mains supply is done under contract with the supplier.</p> <p>Water supply at is obtained from groundwater wells located at Uherske. These are owned and operated by Ukrtransgaz and licensed under the site water permit. An inspection by the Sanitary Authority in November 2015 at Uherske &amp; Bilche-Volytsko-Uherske identified problems with the quality of water and required improvement, so drinking water supply is obtained from a third party supplier. Water from the well is still used as process water, mainly for boiler top-up.</p>		
3.7	<b>Wastes</b>	PC	<p>Wastes generated by operations include general household type waste, oil sludge, solid and liquid drilling sludges, scrap metal, construction waste, waste oils, batteries, tyres and fluorescent lamps. All locations maintain inventories of waste produced.</p> <p>Waste permits are understood to no longer be required but generation is reported annually to regulators.</p> <p>Wastes have been effectively identified and classified, rates of generation are monitored, and contracts are in place with licensed disposal contractors. However, arrangements for post collection tracking (e.g. manifesting, downstream tracking,</p>	Conduct a review of post-collection waste tracking.	3.1(f)
3.8	<b>Safe Use and Management of Hazardous Substances and Materials</b>	PC	<p>Bulk chemical storage at the facilities largely comprises oils, fuels and glycol. Oil and chemical storage, particularly in above ground tanks, generally does not meet BAT standards:</p> <ul style="list-style-type: none"> <li>Most above ground storage tanks are bunded but bunds were inadequate and/or in poor condition. Bund walls were frequently damaged - variously cracked or with evidence of significant wall movement. Bunds are only partially paved and large areas are not surfaced with hardstanding. Where hardstanding is present, it is</li> </ul>	<p>Conduct a review of systems, processes and equipment for storage facilities for oil, fuel and chemicals against applicable BAT requirements.</p> <p>This should include bunding of storage tanks, containment of delivery areas, inspection programs for delivery hoses and underground pipework and improved spill</p>	3.1(e)

KPI REF.	PERFORMANCE STANDARD	SCORE	COMMENTS / ISSUES	ACTIONS REQUIRED	ESAP REF.
			<p>in poor condition. Pipework frequently passes through bund walls and is not sealed, compromising bund integrity. Drainage from bunds is not controlled, and bunds discharge directly to site drainage.</p> <ul style="list-style-type: none"> <li>• Delivery pipework is outside containment and there is no robust system for inspection and testing of pipes and hoses. Hoses were not well protected and some were in poor condition. Tanker off load areas were generally not contained and spills would run off to land, site drainage or surface watercourses. At Bilche-Volytsko-Uherske, the same pipework is used for deliveries of both oil and glycol.</li> <li>• Underground pipework is not subject to routine inspection and testing at most sites.</li> <li>• Stocks of absorbents are held on operational sites, although observations indicate that this is mainly limited to sand, with no purpose made absorbents. Naftogaz reported that expanded perlite is available, but none of this material was observed. At Bilche-Volytsko-Uherske, glycol spills are washed to drainage with water.</li> </ul>	response procedures and equipment.	
			<p>Asbestos cement sheet is present extensively throughout buildings and structures in all locations. Some sheeting was observed to be damaged. There are no plans to remove the material and management reported that most of the materials cannot be removed at the moment.</p> <p>No formal surveys or testing for the presence of asbestos have been conducted, and no formal management programs are in place.</p>	Develop and implement a formal management program for identification and management of asbestos to minimise the potential for damage to asbestos containing materials and minimise potential for exposure to asbestos fibres.	3.3
<b>3.9</b>	<b>Pesticide Use and Management</b>	NA	No significant pesticide use was identified at the sites.	No actions required.	-
<b>EBRD PR 4</b> <b>IFC PS 4</b>	<b>HEALTH AND SAFETY</b> <b>COMMUNITY HEALTH, SAFETY, AND SECURITY</b> <b>Summary</b>		A number of actions areas have been identified where gaps have been identified in this review.		

KPI REF.	PERFORMANCE STANDARD	SCORE	COMMENTS / ISSUES	ACTIONS REQUIRED	ESAP REF.
4.1	Community Health and Safety	PC	Mobile phones were required to be switched off or left behind for site tours. However, whilst on the operating site it was observed that several Lvivtransgaz personnel received and took calls on their mobile phones and it appeared that their phones remained switched on during the rest of the site walkaround. Potential for an explosion or fire with offsite consequences.	Recommend a strict enforcement of the control of ignition sources and the carrying of non-intrinsically safe mobile phones on site should not be allowed at all.	4.1
			A mixture of temperature, flame detection, smoke and methane is monitored using fixed sensors and also manually as per a preplanned schedule for specific buildings/rooms where there is a significant risk of build-up of a flammable atmosphere if a leak were to occur. At Bilche-Volytsko-Uherske the oil/ ethylene glycol pumping room did not have fire or smoke detection. Loss of collant to gas compressors has potential for major explosion and fire with offsite consequences.	It is recommended that leak/ fume detection and fire/ smoke detection to be installed in ancillary buildings that house safety critical equipment.	4.2
4.2	Hazardous Materials Management and Safety	PC	The main hazardous material on site is the methane gas from a major hazards fire/explosion perspective. There are also significant quantities of diesel, lubricating oils and diethylene glycol which present more of a land contamination issue if there were to be a loss of containment incident.	Refer to Action 3.1(e) above	3.1(e)
4.3	Ecosystem Services	NA	Refer to Section 6 below.	No actions required.	-
4.4	Product and Services Safety	NA	This project does not involve production of and/ or trade in consumer products. The project involves the storage and distribution of natural gas.	No actions required.	-
4.5	Traffic and Road Safety	FC	There is limited site traffic and none was observed during the audits undertaken. No issues identified.	None required	-
4.6	Natural Hazards	FC	None identified.	None required	-
4.7	Community Exposure to Disease	PC	At Uherske, it was noted that cooling tower systems are dosed with water softener and corrosion inhibitor, but that biocides are not added to the system. It is not known if	It is recommended that cooling tower management is reviewed to ensure that sufficient maintenance, biocidal dosing and testing is	4.3

KPI REF.	PERFORMANCE STANDARD	SCORE	COMMENTS / ISSUES	ACTIONS REQUIRED	ESAP REF.
			Legionella testing is conducted on the systems. Potential for legionneal bacteria to be carried offsite in the mist from the cooling towers leading to a potential outbreak of legionnaires disease in the local community	conducted to minimise the potential for Legionella.	
4.8	Emergency Preparedness and Response	PC	Emergency plans appear to focus on major process incidents involving large scale loss of containment and are very prescriptive as to the steps to be taken for each defined scenario.  Potential that some emergency scenarios with offsite consequences may not be addressed in the current emergency plan	It is recommended that the plan should demonstrate that all types of probable emergency scenarios have been addressed. Areas for consideration should include major injuries and health effects, major environmental damage, fire, flood and storm.	4.4
			In the event of an emergency, the Despatch Operator is required to lookup the scenario in the manual for the required actions. However, this did not appear to be practical in a real incident.  Slow response has potential for an onsite emergency to quickly escalate into an offsite emergency.	It is recommended that a simplified version of the emergency plan and steps should be made available for operators to access swiftly in the event of an incident.	4.5
4.9	Security Personnel	PC	At all sites the boundary had a physical barrier in the form of a concrete panel/ wire mesh fencing, with razor/barbed wire fitted on top of fencing at some. Some sites have CCTV at the boundary and other sensitive parts of site are fitted with motion sensors. Some well heads are protected by mesh fencing.  Potential for an offsite emergency to be caused by intruders with malicious intent.	All sites should consider installing razor/barbed wire at the top on main fence and also around High Voltage Transformer stations.	4.6
IFC PS 6	BIODIVERSITY CONSERVATION AND SUSTAINABLE MANAGEMENT OF LIVING NATURAL RESOURCES <b>Summary:</b> No specific actions are required; any action is captured in the compliance assessment for review of environmental and social risks under PS1.				
6.1, 6.2	Assessment of Biodiversity and Living Natural Resources and Protection and Conservation of Biodiversity	PC	EIAs for the gas storage facilities were not available for this review; therefore a rating of fully compliant could not be assigned.  The OVNS process does not generally assess potential impact on biodiversity and associated mitigation to the	See KPI Ref 1.1 and 3.3 above.	-

KPI REF.	PERFORMANCE STANDARD	SCORE	COMMENTS / ISSUES	ACTIONS REQUIRED	ESAP REF.
			<p>extent required by IFC. With that said, online searches indicate there are no protected sites within the vicinity of any of the storage facilities and both Naftogaz and Ukrtransgaz report that none of their facilities have impacted upon any protected or designated areas or areas important for local biodiversity. Documentation to show the assessment undertaken to make this determination was not provided.</p> <p>Housekeeping at the sites was good and no particular attractants for wildlife were observed. All the sites are fenced (non-electrified) and vegetation on site is landscaped.</p> <p>There are a number of watercourses and water bodies in the vicinity of the sites, but any actions required to protect these would be captured by actions required for discharge streams under PS3 above.</p>		
6.3	Management of Ecosystem Services	N/A	The Project is not likely to adversely impact ecosystem services.	N/A	-
6.4	Sustainable Management of Living Natural Resources	N/A	The Project does not involve the primary production of living natural resources.	N/A	-
6.5	Supply Chain	N/A	The Project is not purchasing significant volumes of primary products such as food and fiber commodities.	N/A	-
<b>IFC PS 8</b>	<b>CULTURAL HERITAGE</b>				
	<b>Summary:</b>				
	The current procedures are compliant with national legislation; however, a more holistic approach to assessment and management of cultural heritage is required to meet IFC standards.				
8.1	Assessment and Management of Impacts on Cultural Heritage	PC	<p>EIAs for the gas storage facilities were not available for this review; therefore a review of the potential presence of cultural heritage within the gas storage sites could not be completed.</p> <p>Naftogaz does report that none of the development of the</p>	<p>Ensure that during the EIA process for all proposed sites that cultural heritage implications are considered.</p> <p>Develop a chance find procedure to</p>	1.2

KPI REF.	PERFORMANCE STANDARD	SCORE	COMMENTS / ISSUES	ACTIONS REQUIRED	ESAP REF.
8.2	Protection of Cultural Heritage in Project Design and Execution	PC	<p>organisation's facilities involved significant excavations, demolitions, movement of earth, flooding or other changes in the physical environment and that none of its facilities are located in, or in the vicinity of, a nationally recognised cultural heritage site. No specific documentation has been provided in this regard.</p> <p>Ukrtransgaz also reported that none of the development of the organisation's facilities involved significant excavations, demolitions, movement of earth, flooding or other changes in the physical environment, though this would seem unlikely to apply to all facilities given their nature.</p>	be used during construction to aid in managing archaeological finds.	
8.2	Consultation with affected communities and other stakeholders		Refer to KPI Ref 1.7.	Refer to KPI Ref 1.7.	-
8.3	Project's use of Cultural Heritage	NA	No project use of cultural heritage envisaged.	N/A	-
	OVERALL COMPLIANCE				
	National Environmental, Social, Health and Safety Requirements		Company operations are anticipated to meet national EHSS legal requirements.	Action proposed in this table and ESAP.	All

# Appendix A

**DOCUMENTATION**

APPENDIX A-1

**DOCUMENT LOG**

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Document Title/Description	Language
<b>Naftogaz</b>	
Environmental and Social Corporate Due Diligence Questionnaire, NAK Naftogaz Trade Guarantee Facility, Naftogaz, October 2015	English
Schedule 5 (EBRD ESAP), EBRD, 2015	English
Code of Corporate Ethics National Joint-Stock Company "Naftogaz of Ukraine", undated, understood to be current	English and Ukrainian
Screen shot of the SharePoint-based database (Hammer) used for storage of standards and procedures at the company	Ukrainian
Naftogaz of Ukraine Annual Report, 2015	English
Collective bargaining agreement for Naftogaz: The Collective Bargaining Agreement for 2012-2015 was accepted at the conference of employees of Naftogaz and registered in Schevshenkovskaya region administration of Kiev, registration number 278 of 25.06.2012	Ukrainian
Naftogaz Health & Safety standard, System of Safety Management of Naftogaz of Ukraine COY 74.1-20077720-025:2006 dated 2006 developed by OJSC Ukrainian Center of Ecology, Safety and Security in Oil and Gas Industry and valid from 25.12.2006 (no end date).	Ukrainian
Naftogaz Environmental Action Plan 2015-2020, N196 dated 16.06.15	Ukrainian
Traffic Safety Action Plan for 2016. No date and number of the document, it is an attachment to an Order of Naftogaz	Ukrainian
Training plan for human resources and social protection plan for 2015, dated 29.01.2015	Ukrainian
<b>Ukrtransgaz and Site-Specific Documents</b>	
Environmental and Social Corporate Due Diligence Questionnaire, NAK Naftogaz Trade Guarantee Facility, Ukrtransgaz, October 2015	English
List of applicable legislation and standards for Ukrtransgaz	Ukrainian
ISO 9001:2008, Certificate number 01 100 115814, issued by TUF Rheinland Cert GbbH on 08.08. 2013, validity dates: 2012.06.05 – 2015.06-04, audit report number 115814. Scope of the certification: Transportation and storage of natural gas.	Ukrainian
ISO 14001:2004, Certificate number 01 104 1157814 issued by TUF Rheinland Cert GbbH on 08.08. 2013, validity dates: 2012.06.05 – 2015.06-04, audit report number 115814. Scope of the certification: Transportation and storage of natural gas.	Ukrainian
BS OHSAS 18001:2007 Certificate number 01 113 115814, issued by TUF Rheinland Cert GbbH on 08.08. 2013, validity dates: 2012.06.05 – 2015.06-04, audit report number 115814. Scope of the certification: Transportation and storage of natural gas.	Ukrainian
ISO 50001:2011, Certificate Registration No 12 340 47135 TMS, issued by The Certification Body of TUF SUD Management Services GmbH on 2014.01.15, validity dates: 2014.10.25 – 2017.01.14, audit report No 707020705.	Ukrainian
Emergency response plans: Two examples of some sections of Emergency Response Plans were provided for Oparske and Dashavske. Front pages of the documents were received for the remaining sites.	Ukrainian
ISO integrated management system manuals: A full copy of the manual was provided for Dashavske and front pages and tables of contents for the remaining 4 UGSFs.	Ukrainian
Drainage / utilities maps were provided but of poor quality (difficult to read)	Ukrainian
Copies of environmental permits for air and water as follows: <ul style="list-style-type: none"> <li>• Uherske: Permit for emissions of pollutants to atmosphere air from the stationary sources No 4625388401-5 of 06.03.2015</li> <li>• Bilche-Volytsko-Uherske: Permit for emissions of pollutants to atmosphere air from the stationary sources No 4625385801-1 of 06.03.2015</li> <li>• Oparske: Permit for emissions of pollutants to atmosphere air from the stationary sources No 4621285701-1 of 12.08.14</li> <li>• Bogorodchany: Permit for emissions of pollutants to atmosphere air from the stationary sources No 2620455100-12 of 08.01.14</li> <li>• Dashavske: Amendment to Permit for emissions of pollutants to atmosphere air from the stationary sources No 4625355300-2a of 08.01.2013</li> <li>• Oparske: Permit for special water use, front page only</li> <li>• Bogorodchany: Maximum allowable discharge of the substances to the water facility with return waters, approved on 06.05.2015, front page and a layout</li> </ul>	Ukrainian

Document Title/Description	Language
<ul style="list-style-type: none"> <li>• Dashavske: Permit for special water use</li> <li>• Bogorodchany: Waste discharge Permit 1493 of 25.09.2013 for disposal of wastes in 2014</li> </ul>	
<p>Results of most recent air monitoring for all five USGFs. Results were from 2014 for Dashavske, 2009 from Uherske, and 2015 from the remaining 3 sites.</p>	Ukrainian
<p>Results of groundwater discharge monitoring:</p> <ul style="list-style-type: none"> <li>• Bogorodchany. Protocol 153 for measurement of groundwater. Place – well No 12-B. Date – 13.07.2015.</li> <li>• Bogorodchany. Protocol 154 for measurement of waste water quality. Place – sewage well. Date – 13.07.2015.</li> <li>• Uherske. Protocol No 3-14, Place- well. Date - 07.11.2014.</li> <li>• Bilche-Volytsko-Uherske. Protocol No 8-15, Place-reservoir of purified waters SPV. Date - 17.06.2015.</li> <li>• Bilche-Volytsko-Uherske. Protocol No 9-15, Place-reservoir of purified waters SPV. Date - 06.07.2015.</li> <li>• Bilche-Volytsko-Uherske. Protocol No 10-15, Place-reservoir of purified waters SPV. Date - 29.07.2015.</li> <li>• Bilche-Volytsko-Uherske. Protocol No 11-15, Place-reservoir of purified waters SPV. Date – 15.10.2015.</li> <li>• Uherske. Protocol 11-14 of water quality investigation. Place – GZP No5. Date 07.11.2014,</li> <li>• Uherske. Protocol 10-14 of water quality investigation. Place – GZP No5. Date 27.10..2014</li> <li>• Uherske. Protocol 2-14 of water quality investigation. Place – Well. Date 24.03.2014</li> </ul>	Ukrainian
<p>Most recent air and water compliance reports to the authority:</p> <ul style="list-style-type: none"> <li>• Oparske: <ul style="list-style-type: none"> <li>○ Report on protection of air for 2014. State Statistical Survey. The report contains data on annual emissions in tonnes.</li> <li>○ Report on water use for IV quarter 2014</li> <li>○ Protocol 7-15 on quality of waste water, I quarter 2015. The protocol contains measurement results of the quality of water discharged to river Liutchuna.</li> <li>○ Protocol 21-15 on quality of waste water, IV quarter 2015. The protocol contains measurement results of the quality of water discharged to river Liutchuna.</li> <li>○ Protocol 14-15 on quality of waste water, II quarter 2015. The protocol contains measurement results of the quality of water discharged to river Liutchuna.</li> <li>○ Protocol 09-15 on emission measurement from the stationary sources.</li> </ul> </li> <li>• Bogorodchany: <ul style="list-style-type: none"> <li>○ Report on protection of air for 2014. State Statistical Survey. The report contains data on annual emissions in tonnes.</li> <li>○ Report on water use for IV quarter 2014.</li> <li>○ Protocols 116-118 of 10.11.2015 on quality of waste water. The protocol contains measurement results of the quality of water discharged to river Sadzhava.</li> </ul> </li> <li>• Dashavske: <ul style="list-style-type: none"> <li>○ Report on protection of air for 2014. State Statistical Survey. The report contains data on annual emissions in tonnes.</li> <li>○ Report on water use for I - IV quarter 2014.</li> <li>○ Protocol 11-15 for measurement of emission from the stationary sources of Dashavske.</li> </ul> </li> <li>• Bilche-Volytsko-Uherske: <ul style="list-style-type: none"> <li>○ Report on protection of air for 2014. State Statistical Survey. The report contains data on annual emissions in tonnes.</li> <li>○ Report on water use for IV quarter 2014.</li> <li>○ Protocol 15-15 and 16-15 for measurement of emission from the stationary sources</li> </ul> </li> <li>• Uherske:</li> </ul>	Ukrainian

Document Title/Description	Language
<ul style="list-style-type: none"> <li>o Protocol 11-14 of 07.11.2014 of water quality investigation</li> </ul>	
<p>2015 Declarations on Waste Management:</p> <ul style="list-style-type: none"> <li>• Dashavske: <ul style="list-style-type: none"> <li>o Report on production and handling of wastes for 2014</li> <li>o Declaration of production of wastes in 2015</li> </ul> </li> <li>• Oparske: <ul style="list-style-type: none"> <li>o Report on production and handling of wastes for 2014</li> <li>o Declaration on production of wastes in 2015</li> </ul> </li> <li>• Bilche-Volytsko-Uherske and Uherske: <ul style="list-style-type: none"> <li>o Report on production and handling of wastes for 2014</li> </ul> </li> <li>• Declaration of production of wastes in 2015 Bogorodchany: <ul style="list-style-type: none"> <li>o Report on production and handling of wastes for 2014</li> <li>o Declaration of production of wastes in 2015</li> <li>o Permit for waste production for 2014, not valid in 2015.</li> </ul> </li> </ul>	Ukrainian
<p>Report on most recent site inspections by safety authority:</p> <ul style="list-style-type: none"> <li>• Bilche-Volytsko-Uherske and Uherske: <ul style="list-style-type: none"> <li>o Act of State Committee of Ukraine on Industrial Safety (Derhgirpromnagliad), Western inter regional state inspection of industrial; safety and occupational safety in oil and gas complex No 5-5-58 of 18.05.2010.</li> <li>o Act of complex check of automatic fire extinguishing systems of gas compressor units in the shops 1, 2, 3, 1A, 4 during 21-25 June 2015.</li> <li>o Act of the State Labour Office on check of business entity of 17 November 2015 No 13/07/087/0027 on the occupational safety management.</li> <li>o Act of State Committee of Ukraine on Industrial Safety (Derhgirpromnagliad), Western inter regional state inspection of industrial; safety and occupational safety in oil and gas complex No 7-3/3 of 14.01.2014.</li> <li>o Order of State Committee of Ukraine on Industrial Safety 7-3/3 of 11.10.2013 on eliminations of revealed deviations</li> <li>o Order of State Committee of Ukraine on Industrial Safety No 8-7/44 of 11.10.2013 on eliminations of revealed deviations related to elevators</li> </ul> </li> <li>• Oparske: <ul style="list-style-type: none"> <li>o Act of the State Labour Office on check of business entity of 20 November 2015 No 13/13/087/0028 on occupational safety management</li> </ul> </li> <li>• Bogorodchany: <ul style="list-style-type: none"> <li>o Act of the State Labour Office on check of business entity of 18 November 2015 ІФ No 0034-03 on occupational safety management:</li> <li>o Plan of measures for elimination of the deviations registered in the above Act with the respective deadlines was prepared.</li> </ul> </li> <li>• Dashavske: <ul style="list-style-type: none"> <li>o A plan for measures for improvement of occupational safety</li> </ul> </li> </ul>	Ukrainian
<p>Report on most recent site inspections by the environmental authority:</p> <ul style="list-style-type: none"> <li>• Bogorodchany: act of the site inspection dated 26.10.15-06.11.15 by the State Ecological Inspection in Ivano-Frankivsk Oblast</li> <li>• Bilche-Volytsko-Uherske: improvement notice N 1195-06 dated 20.12.13 as a result of the site inspection dated 02-20.12.13 by the State Ecological Inspection in Lviv Oblast</li> </ul>	Ukrainian
<p>Reports on inspections by health or safety authorities in 2015:</p> <ul style="list-style-type: none"> <li>• Bogorodchany: improvement notice N 1231 dated 02.11.15 as a result of the site inspection dated 26-30.09.15 by the State Department of Sanitary Epidemiological Service in Lviv Oblast</li> </ul>	Ukrainian
<p>Example of safe working procedure (e.g. hot work): Instruction N 2.3 for safe work (fire works) at Bilche-Volytsko-Uherske.</p>	Ukrainian
<p>Examples of completed permits to work: A number of documents including internal permits, job orders, training records, plans for the work execution, orders for execution of works, reporting on execution of works</p>	Ukrainian
<p>A list (only) of contractor management procedures and approval procedures</p>	Ukrainian
<p>List of hazardous materials</p>	Ukrainian

<b>Document Title/Description</b>	<b>Language</b>
Ongoing action plans for environment, H&S and fire protection at Oparske, Bilche-Volytsko-Uherske, Dashavske and Bogorodchany.	Ukrainian
Lists of EX1 electrical rated equipment for Oparske, Bogorodchany and Bilche-Volytsko-Uherske	Ukrainian
Noise monitoring data (maximum and minimum) at all five UGSFs.	Ukrainian
Oparske Technical Passport, dated 01.01.2015 signed on 26.02.15	Ukrainian
Reports on sanitary protection zones: <ul style="list-style-type: none"> <li>• Bogorodchany: Conclusion of the State Epidemiological Appraisal in Ivano-Frankivsk Oblast, 05.03.02-07/83884, 17.09.2013</li> <li>• Bilche-Volytsko-Uherske: Letter from State Sanitary Epidemiological Service in Lviv Oblast, 4625385801-1386/08-02/282, 13.02.2015</li> <li>• Dashavske: Conclusion of the State Epidemiological Appraisal in Lviv Oblast, 05.03.02-07/66574, 16.10.2008</li> <li>• Oparske: Letter from State Sanitary Epidemiological Service in Lviv Oblast, 2791/08-06/01/61, 01.08.2014</li> <li>• Uherske: Two Conclusions of the State Epidemiological Appraisal in Lviv Oblast, 05.03.02-07/67562 and 05.03.02-07/1485, 26.10.2009 and 17.01.2013</li> </ul>	Ukrainian
<b>Bilche-Volytsko-Uherske:</b>	
Technical Regulation for Return of Groundwater to the Ground: Developed by Ukrainian Scientific Research Institute for Gas in 2010. Technical Regulation was approved by the State Department of Environmental Protection in Lviv Oblast, letter N 04-02-4963 dated 07.09.10.	Ukrainian
Most recent testing records for crane in compressor house 2015: Results of technical test N 24746520-09-028.1-0003-14 dated 10.02.14 and valid till 05.02.19 for the travelling (bridge) crane.	Ukrainian
<b>Dashavske:</b>	
Site air emission point inventory: Air emission point inventory is presented in a report by Euroecoscope Ltd. dated 2007	Ukrainian
Copy of a contract with waste disposal contractor: Contract parties: PAT "Lvivtransgas" and "EKORENSING" Ltd, Subject matter of the Contract: services with the ID code 38.2.22 – Disposal of nuclear and other hazardous waste (Disposal of hazardous and other waste of Lvivtransgas).	Ukrainian
2001 Energy Audit Table of Contents	Ukrainian
<b>Bogorodchany:</b>	
Results of most recent water monitoring: Waste water quality results dated 13.07.15.	Ukrainian
2014 Waste Permit and associated correspondence with the authority: <ul style="list-style-type: none"> <li>• Waste permit N 244 Bog dated 11.09.14 valid from 01.01.13 till 31.12.14 issued by the Department of Ecology and Natural Resources of Ivano-Frankivsk Oblast State Administration.</li> <li>• A letter to the Department of Ecology and Natural Resources dated 08.05.15 requesting explanation on reporting and a letter dated 16.06.15 from the Department stating that there is no regulation yet.</li> </ul>	Ukrainian
Report on most recent internal audit by Prykarpatttransgaz: Audit N 1/2014 dated 04.04.14.	Ukrainian
2014 occupational hygiene monitoring report (noise, air quality, vibration and light): Date – May 2014. Document is called Conclusions on the monitoring of the sanitary technical conditions of Bogorodchany.	Ukrainian
Underground storage tank testing reports (2008): Protocols of testing N 1244 dated 18.07.08 for the tank E1 and N 1245 dated 22.07.08 for the tank E2 by ultrasonic defectoscope.	Ukrainian

# Appendix B

ESAP

## APPENDIX B-1

**ESAP**

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# Appendix C

## RISK MATRIX

Probability	Very high	Low	Medium	Medium	High	Very High
	High	Low	Medium	Medium	High	Very High
	Medium	Low	Low	Medium	High	Very High
	Low	Very Low	Low	Medium	High	High
	Very Low	Very Low	Low	Medium	Medium	High
		Very Low	Low	Medium	High	Very High
	Impact					

