

Sakhalin-2 Phase 2 Project
Lenders' Independent Environmental Consultant

Environmental Audit of the Onshore Processing Facility

October 2013

Prepared for:
Sakhalin-2 (Phase2) Project Finance Parties

Prepared by:
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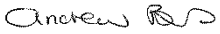
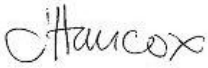
Manchester, UK

Date:
November 2013

Project or Issue Number:
UK22-17081

ENVIRON

Contract No:	UK22-17081
Issue:	1
Author (signature):	Andrew Bloss 
Project Manager/Director (signature):	Jon Hancox 
Date:	11 November 2013

Version Control Record

Issue	Description of Status	Date	Reviewer Initials	Author Initials
1	Issue 1 for Sakhalin Energy Comment	11 October 2013	JH	AB

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List of Abbreviations

ALARP	As Low As Reasonably Practicable
BOD	Biological Oxygen Demand
BS2	Booster Station 2
CCB	Central Control Building
ETP	Effluent Treatment Plant
HDPE	High-density polyethylene
HSEMS	Health, Safety and Environmental Management System
HSESAP	Health, Safety, Environment and Social Action Plan
IBC	Intermediate Bulk Container
ISOS	International SOS, medical services provider at the OPF
IEC	Independent Environmental Consultant
LNG	Liquefied Natural Gas
LRQA	Lloyd's Register Quality Assurance
LUN-A	Lunskoye A Platform
MEG	Monoethylene glycol
MPC	Maximum Permissible Concentration
MPE	Maximum Permissible Emission
MSDS	Material Safety Data Sheet
NORM	Naturally Occurring Radioactive Material
ODP	Ozone Depleting Potential
ODS	Ozone Depleting Substances
OET	Oil Export Terminal
OIM	Onshore Installation Manager
OPF	Onshore Processing Facility
OSR	Oil Spill Response
OSRP	Oil Spill Response Plan
PA-A	Piltun-Astokhskoye A offshore Platform
PA-B	Piltun-Astokhskoye B offshore Platform
PAO	Permanent Accommodation Area and Offices
PCBs	Polychlorinated Biphenyls
PMD	Pipeline Maintenance Depot
PPE	Personal Protective Equipment
PTW	Permit To Work
RR	Russian Register

RF	Russian Federation
RoW	Right of Way
Sakhalin Energy	Sakhalin Energy Investment Company Ltd
STP	Sewage Treatment Plant
SPZ	Sanitary Protection Zone
QMS	Quality Management System
TSS	Total Suspended Solids
WHO	World Health Organisation

Executive Summary

ENVIRON UK Ltd, acting in the role as the Lenders' Independent Environmental Consultant (IEC) for the Sakhalin-2 Phase 2 project (the 'Project') visited the Project in October 2013 to audit certain Project facilities in accordance with the lenders' loan agreement. This report presents the findings of an audit performed of the Onshore Processing Facility (OPF). The environmental audit assessed the Company's compliance with material environmental law and the Sakhalin Energy Health, Safety, Environment and Social Action Plan (HSESAP). The auditors would like to thank the auditees for their assistance with the audit.

Overall ENVIRON considers that environmental performance at the OPF is very good. There is a robust and well implemented HSE management system in place, and there is evidence of a strong environmental management culture at the facility. However, while there was a generally good level of compliance with environmental law and the requirements of the HSESAP, the following Findings were identified:

- HSE Management Systems
  - The structure of the Aspects Register generally meets the requirements of ISO14001. However, we identify a number of areas where the detail of register requires improvement in order that it identifies all environmental aspects and acts as an effective tool to help prioritise management controls and improvement initiatives. Examples of environmental aspects that are currently not fully addressed in the Aspects Register include:
    1. Storage and management of fuel (only unrefined oil is considered). We note that there is bulk storage of diesel at the OPF and this should be specifically addressed in the Aspects Register.
    2. Routine management of non-hazardous solid waste (this is currently only considered in the context of emergency events). Given on-going issues related to the adequacy of the Nogliki landfill and landfill capacity more generally on Sakhalin, we would expect this to be a high priority issue in the Aspects Register.
    3. Control of ozone depleting substances.
    4. Water abstraction/use.
    5. Energy consumption.
    6. Air emissions are identified as a low (C2) risk rating under the Aspects Register. Given the challenges of meeting Russian Federal Government Decree #7 on flaring of associated gas (see also below), we suggest that this risk rating should be re-evaluated.
  - During the course of the audit, it was identified that the OPF HSE team considered that Level 3 audits would be undertaken by the Corporate HSE team and no Level 3 audits had been scheduled by the OPF for 2013. Subsequent discussions with the Corporate HSE team confirmed that Level 3 audits should be site managed self-assurance activities.

- Emissions to Atmosphere
  - From the emission results supplied to ENVIRON, the emissions from the electricity generating turbines at the OPF do not currently appear to comply with the NOx emission requirements of the HSESAP. In addition, carbon monoxide concentrations from the stack appear to be in excess of RF limits in some instances. However, full understanding of the nature of the results and any apparent exceedances of HSESAP/regulatory limits is difficult to determine on the basis of the available monitoring data. In particular, further details on the operating conditions under which the stack monitoring was undertaken are required.
- Wastewater Management
  - Sakhalin Energy is currently assessing options for the installation of an improved water treatment facility to resolve this issue. The current timeline for an upgraded system to be ready to operate is January 2018. In the interim, the Company is assessing whether it would be appropriate to request that the discharge limits for TSS and dispersed hydrocarbon set in the licence for the disposal well be increased.
  - 2013 discharge monitoring data for the STPs identified permit discharge concentration exceedances against Russian permit levels in relation to nitrate and Biological Oxygen Demand (BOD).
- Waste Management
  - All the waste storage areas viewed by ENVIRON were found to be well labelled, however a small selection of drums located in the Temporary Waste Transit Area was found to be unlabelled.
  - The clinical waste incineration facility used by medical services provider ISOS has not been inspected by Sakhalin Energy.

In addition, a number of suggestions to improve performance have been highlighted in this audit report as follows:

Suggestions:

- An examination of the wood to be passed to local people identified that some had been treated, potentially with various forms of wood preservative. Should this preserved wood be burnt, a potential exists for the release of toxic substances (e.g. arsenic). It is therefore suggested that Sakhalin Energy reviews the usage of the wood by the public and if wood is used for burning then treated and untreated waste wood should be separated so that only untreated wood is passed to local people for burning.
- Spills from the monoethylene glycol (MEG) storage tanks would be captured within the bund. However, the bund does not have an in-built system to enable the bund to be drained to an isolation tank. We suggest that written procedures are developed to address how MEG would be removed from the bund in the event of a spill.
- Although the use of R22 in domestic-sized refrigeration equipment is permitted by Sakhalin Energy it is suggested that alternatives are considered (R417A is a drop-in replacement for R22 and has an ozone depleting potential of zero). Given the large

number of units across all Sakhalin Energy assets that contain ozone depleting substances (ODS), ENVIRON suggests that consideration be given to undertaking the replacement of ODS on a corporate level.

- ENVIRON suggests that the permit to work approval process be modified to ensure that individual training requirements are automatically checked as of the grant of the permit to work.

1 Introduction and Audit Scope

ENVIRON UK Ltd (ENVIRON) is the Independent Environmental Consultant (IEC) acting on behalf of the Lenders to the Sakhalin-2 Phase 2 project (the 'Project'). Under the Project loan Terms of Reference, ENVIRON and Lender representatives undertake periodic monitoring visits and audits of the Project. This report details the findings of an audit of the Onshore Processing Facility (OPF or 'the site') undertaken by ENVIRON between 3rd and 5th October 2013.

More specifically, ENVIRON has conducted a Level 1 audit in accordance with paragraph 4.6.3 of the Common Terms Agreement which, among other items, allows for biennial audits of the project facilities. In accordance with the Terms of Reference agreed with Sakhalin Energy *'the audit shall review the Company's compliance with material Environmental Law, Environmental Consents, Project Expansion Environmental Consents and/or Interim Environmental Permissions and the HSESAP'.*

The audit covered the OPF and included gas treatment processes (dehydration, condensate separation and monoethylene glycol (MEG) removal, storage of condensate, flaring, process water treatment/re-injection and all ancillary and service areas (e.g. water and wastewater treatment and electricity generation).

The audit was planned and executed in accordance with the requirements of the relevant international standard (Guidelines for Quality and/or Environmental Management Systems Auditing, ISO19011:2002). Three days were spent at the OPF to complete the following tasks:

- Site Inspection: A brief orientation tour of the facility, followed by detailed inspections of areas of interest including:
  - the two gas processing trains;
  - MEG regeneration plant;
  - storage of chemicals, oils and fuel;
  - wastewater treatment facilities and discharge locations; and
  - the temporary waste storage area.
- Interviews: Meetings with senior management, HSE Department personnel and selected other staff and contractors.
- Document Review: Many documents were reviewed on-site and others were scrutinised after the site audit. These included HSE plans and procedures, monitoring data and various environmental records.

Specific attention was given to:

- the adequacy and implementation of HSE Management Systems;
- air emissions and air quality;
- water usage and wastewater management;
- waste management; and
- hazardous materials.

Elements of the HSESAP considered outside of the scope of this audit are summarised below:

- Road Transport HSE Management;
- Land Management;
- Social Performance (this is addressed in the October 2013 Monitoring visit, which includes consideration of the medical clinic and security arrangements at the OPF); and
- Emergency Response (this was considered to be outside the audit scope due the concurrent specific and detailed audit of all Sakhalin Energy emergency spill response systems by the lenders' spill response specialists).

The Pipeline Maintenance Depot (PMD) at the OPF was visited as part of the October 2013 Monitoring site visit, but was not included as part of the OPF audit.

The itinerary for the OPF audit and a list of the auditees, and is provided in Annex D.

The audit identifies a number of Findings, associated recommendations and suggestions. These are defined:

Finding: A Finding comprises an identified area or topic where the activities of Sakhalin Energy do not conform to either the requirements of Russian Federation law or the Sakhalin Energy HSESAP. Findings may include associated recommendation(s), which outline method(s) by which an issue may be closed out.

Suggestion: Suggestions identify areas of possible environmental performance improvement. Suggestions are made for the benefit of Sakhalin Energy and/or the Lenders.

During the audit, progress made towards the closure of open Findings raised from previous IEC reviews and site visits was reviewed. The updated status of the Findings is provided in a revised Findings Log (see Section 9 of the main IEC Monitoring Visit Report 2013). The Findings Log also includes all new Findings identified as a result of this audit.

A summary of information requests where information/documentation was not available at the time of the site visit is also listed in the main IEC Monitoring Visit Report 2013 (Section 8).

2 Overview of the OPF Plant

2.1 Description of the Facility

The Sakhalin Energy Onshore Processing Facility (OPF or 'the site') is located approximately 27 km east of the offshore Lunskoye A (LUN-A) gas platform. The OPF is the main facility for processing of liquid and gas hydrocarbons received from LUN-A. Oil and associated gas are also received at the OPF from the Piltun-Astokhskoye field and these are combined with the processed LUN-A oil and gas and exported via the Sakhalin Energy pipeline system to the Prigorodnoye Production Complex (comprising the LNG Plant and Oil Export Terminal (OET) at Aniva Bay).

Overall, the OPF is divided into the five areas (also shown in Figure 1):

- The Permanent Accommodation Area and Offices (PAO). This area contains the OPF management office space and also training areas, accommodation space and canteen/relaxation areas for OPF staff. The OPF first aid and medical treatment facility is also located within the PAO. The OPF fire station is also located adjacent to the PAO.
- Warehousing used for the storage of raw materials for the OPF.
- The former (and disused) BETS accommodation camp area.
- The OPF Pipeline Maintenance Depot (PMD). This comprises a facility housing plant and equipment used for accessing and maintaining the pipeline Right of Way (RoW). PMD vehicle maintenance is also undertaken at this location.
- The main OPF process area, which comprises:

1. Inlet facilities, including the "parking loop". These comprise three phase separators used to initially segregate gas, condensate and MEG/water mixture. Some filtration of liquid phases also occurs at this stage. The parking loop is used to contain liquid "slugs" from the incoming pipeline that the inlet separators cannot handle.
2. Gas processing trains. Downstream of the inlet facilities are two identical gas process trains, which undertake condensate stabilisation (where gas is separated from condensate and stabilised condensate is produced) gas compression (where gas recovered from the stabilisation unit is compressed and combined with that from the Inlet facilities) and gas dew point control (where the gas from the compression units is dehydrated to a set specification).
3. Condensate storage tank area. Stabilised condensate is generally continuously injected into the oil passing through the facility, however in the event that excess or off-specification condensate is present; this can be directed to two condensate storage tanks (one serving each gas process train).
4. Crude oil export area. This comprises a pump house used to send crude oil mixed with condensate generated at the OPF to the Sakhalin Energy pipeline system.
5. MEG Regeneration/Reclamation area. This area houses a system for the reclamation, storage and recovery of MEG received in the pipeline from LUN-A (and used to prevent the formation of hydrates). Recovered MEG is sent back to LUN-A for re-use.

6. Gas Flare System. The flare stack is located on the eastern edge of the OPF and comprises a single flare system that takes combustible gases from relief or blow down systems. The system serves to ensure a controlled burn of such gases.
7. PIG Trap Facilities. These comprise facilities for receiving pipeline inspection gauges (PIGs) from LUN-A, the Chaivo landfall (for the Piltun-Astokhskoye field) and for launching PIGs downstream within the Sakhalin Energy pipeline system towards the Prigorodnoye Production Complex.
8. Power Generation. Four 25 MW gas turbines are present within a power generation area. This comprise single cycle turbines that are also used to provide power to LUN-A.
9. Central Control Building. This comprises a single storey explosion resistant building that houses the operational control functions of the process area of the OPF.
10. Booster Compression Station 1. Gas compressors and oil booster pumps are used to transport gas and oil to the Onshore Pipeline System.

Figure 1 below shows the layout of the site and Figure 2 illustrates the overall process flow.

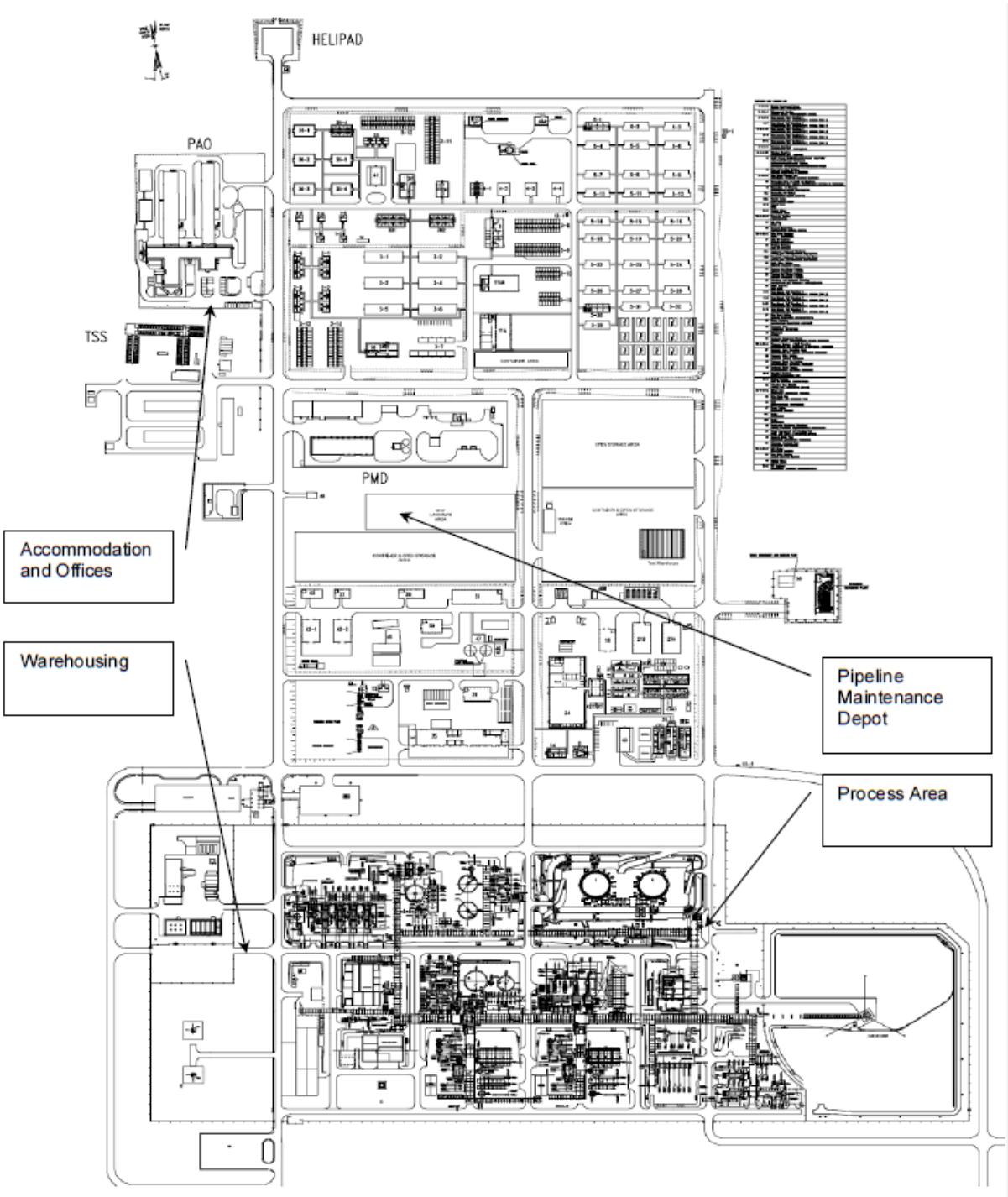

Figure 1: Layout of the OPF

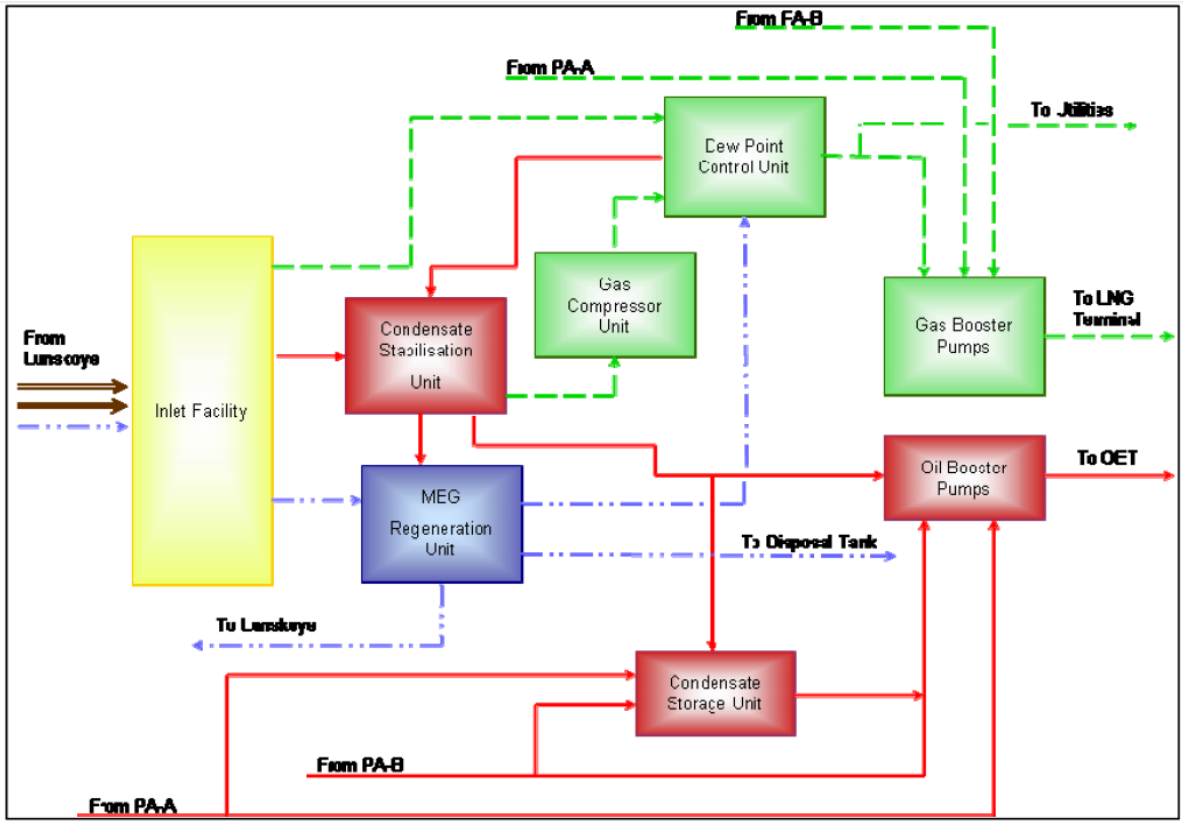

Figure 2: OPF Process Schematic

2.2 Location

The OPF is located at 51° 25' N, 143° 21' E, approximately 7 km inland from the north eastern shore of Sakhalin Island and the landfall point of the pipelines from LUN-A. The OPF is approximately 55km south-east of the town of Nogliki and the nearest permanently populated areas are approximately 30 km distant.

2.2.1 Environmental Setting

The OPF is located on the southern boundary of the Northern Sakhalin Plain (which comprises a relatively flat area that includes numerous swampy/wetland areas) at an elevation 40-80 metres above sea level. The site is surrounded by dark coniferous forest.

No rivers or other surface water bodies are present on the site, which slopes downhill from south to north. However, the Bolotny River is located approximately 1km to the west of the site.

There is a formal Sanitary Protection Zone (SPZ) around the OPF. A map showing the Sanitary Protection Zone around the site is shown in Figure 3.

The OPF is located approximately 7km from a series of lagoons (Piltun, Chaivo, Nyiskiy (Dagi), Nabilsky and Lunsky Bays) that provide breeding sites for a number of wildfowl and shorebirds. In addition, Lunsky Bay provides a nesting habitat for a number of Red Data Book listed bird species (including the Steller's Sea Eagle) and has therefore been formally classified within the Russian Federation as a Nature Reserve.

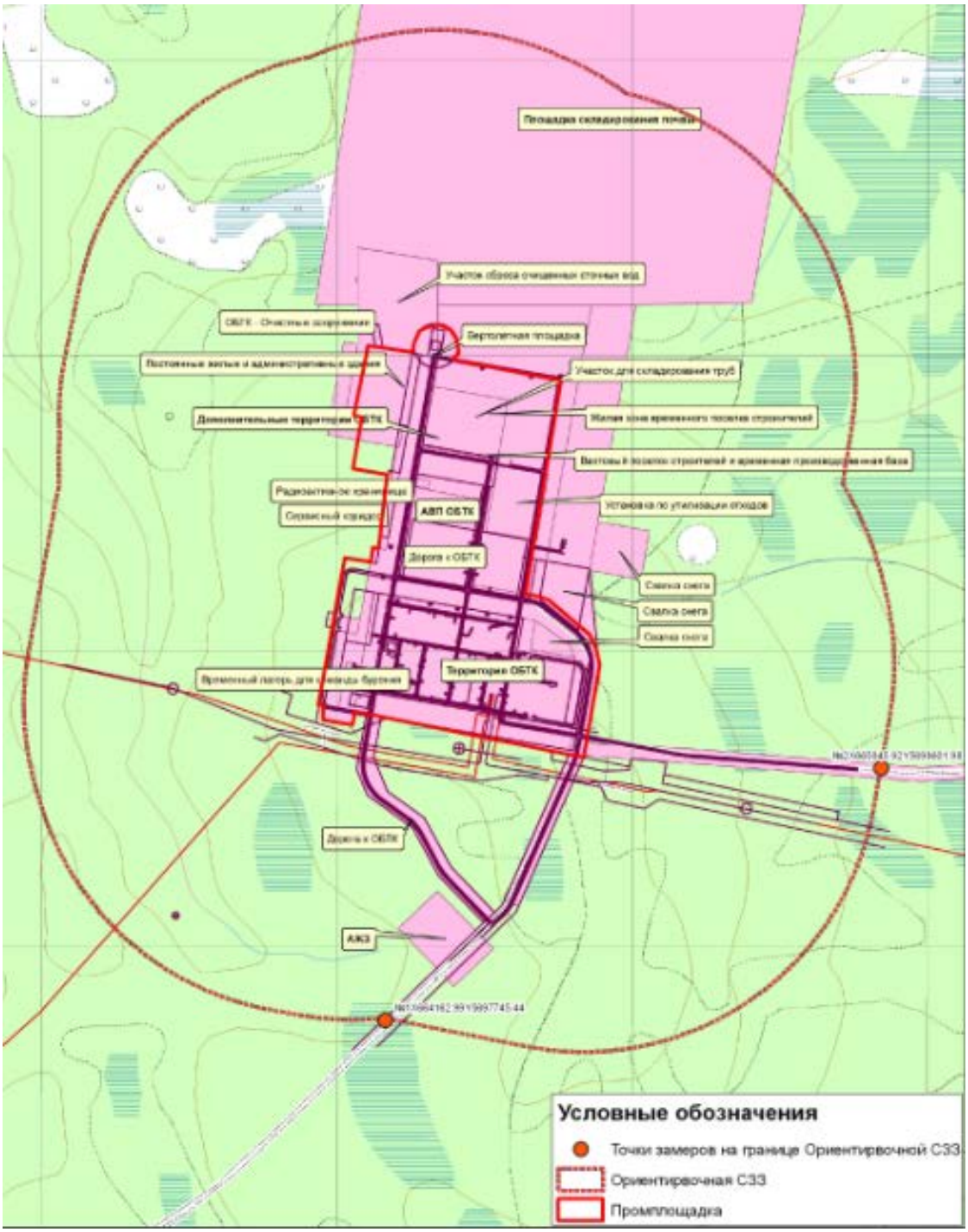

Figure 3: Sanitary Protection Zone around the OPF

The OPF is located in a seismically active area, characterised by moderate seismic activity. Russian Federation General Seismic Zoning Map IND-97-N identifies that the OPF is located in area where there is a 0.2% chance of a level 8 magnitude earthquake.

In the winter, from October to March/April, cold northerly winds prevail while in the summer relatively warm winds from southerly directions predominate. Rivers and lakes generally freeze over in the winter months. Summers are short and feature frequent fogs.

3 Audit Findings

The detailed audit findings presented below contain extracts form the HSESAP. These extracts are not intended to be exhaustive, but rather used as examples to demonstrate compliance or otherwise against HSESAP requirements.

3.1 HSE Management Systems

Sakhalin Energy has an integrated Health, Safety and Environmental Management System (HSEMS) that has been certified to the relevant international standards:

- ISO 14001:2004 (environmental); and
- OHSAS 18001:2007 (occupational health and safety).

It was reported that Sakhalin Energy has recently changed its certification body for ISO 14001:2004 from Lloyds Quality Registered Auditors ("LRQA") to the Russian Register ("RR"). The last visit by the RR was 28th January 2013 until 4th February 2013. No issues were raised relating to the OPF.

The HSEMS has been implemented at the OPF via the HSE Case (Sakhalin Energy document number 6000-S-90-04-T-0001-00-03), which was approved in September 2011. The HSE case details how the OPF meets the requirements of ISO 14001 and OHSAS 18001, and provides a structured framework for managing HSE risks and delivering continual improvement in HSE performance. Key elements of the HSEMS, as applied to the OPF, are outlined below.

3.1.1 Leadership and Commitment

Interviews with the Onshore Installation Manager and other senior management representatives demonstrated an excellent level of commitment to good HSE performance.

3.1.2 HSE Policy and Strategic Objectives

The OPF is subject to the commitments defined in the Sakhalin Energy HSE Management System and the Sakhalin Energy Production Directorate HSE Plans. The Strategic HSE Objectives for the OPF comprise:

- **HSE-MS.** Develop and maintain a risk based HSE-MS application which will enhance the protection of people, the environment, assets and the reputation of Sakhalin Energy from harm insofar as is reasonably practicable.
- **HSE Cases**. Align operation of the OPF with the HSE Cases for all associated Sakhalin Energy assets including offshore platforms, pipeline system, Booster Station 2 (BS2), LNG and OET to demonstrate that all significant hazards and effects have been identified, assessed and control measures put in place to manage any consequences should any of the hazards be realised, with appropriate recovery plans to mitigate any major losses due an occurrence.
- **Contractor HSE Management.** Ensures that the Contractor's targets and objectives are consistent with those of Sakhalin Energy and provides the initial demonstration of the commitment of the OPF management to the implementation of the HSE-MS. Provide on-going support to contractors to enable them to meet Sakhalin Energy HSE targets and objectives. This is achieved through liaison and monitoring of the performance plan. Execution of operations and activities at the OPF is carried out to

ensure that health and safety risks posed by an operation or activity are As Low As Reasonable Practicable (ALARP) and tolerable.

- **Safety.** Plan and manage the HSE training needed to underpin the requisite awareness, knowledge and/or skills necessary for staff and contractors to control HSE risks.
- **Environmental and Waste Management.** Minimise detrimental effects on the environment resulting from OPF operations and activities insofar as is reasonably practicable and implement effective waste management in accordance with the Environmental Management of Land Standard, Waste Minimisation and Management Standard and Waste Management Strategy and Russian Federation requirements.
- **Security.** Protect people, the environment and facilities from the consequences of wilful or accidental security breaches at the OPF.

This audit concludes that these strategic objectives are integrated into the operation of the OPF.

3.1.3 Organisation, Responsibilities, Resources, Standards and Documentation

Key responsibilities for HSE management are clearly shown in an organization chart in the HSE case. The facility has an adequate number of suitably qualified HSE staff.

Systems have been established to ensure that personnel with HSE critical roles have the required level of competence to perform their tasks.

All new employees and visitors are provided with comprehensive HSE awareness training. Specialist training is provided to personnel where necessary and a HSE training matrix was reviewed during the course of this audit that identified the HSE training requirements for all staff. Furthermore, the HSE training records of the Environmental Engineer and waste management facility supervisor were inspected and found to be in order.

Contractor HSE requirements are established in accordance with the requirements of the Contracting and Procurement Procedure and the HSES-SP Management of Contracts Procedure. These documents align with the HSE Management of Contracts Standard (0000-S-90-04-O-0013-00-E) which forms part of the HSESAP.

Contractors working at the OPF are required to comply with the above Standards and also any internal corporate procedures relevant to their contracted tasks. Should these Standards differ, Sakhalin Energy requires that the higher standard shall be applied.

All contractors working for Sakhalin Energy are “stoplight banded”. These bands comprise:

- Green Qualified to work for Sakhalin Energy without restrictions;
- Amber Qualified to work for Sakhalin Energy with restrictions; or
- Red Not qualified to work for Sakhalin Energy (these contractors can only be invited to bid for work after due consideration is given to the contractor company’s ability to adequately manage and control related risks).

The main forms of communication on HSE issues at the OPF are:

- toolbox talks;
- team meetings;

- management coordination meetings;
- HSE meetings;
- Departmental meetings; and
- ad hoc meetings called for specific issues.

In addition to the above, HSE information is also disseminated by posting on the Sakhalin Energy intranet, e-mail bulletins and postings at prominent locations (i.e. HSE noticeboards).

Information communication is undertaken using general presentations to staff, engagement seminars and workshops, posters and I.T. based tools and the use of safety awards.

HSE documentation is also available to staff via the Livelink electronic document management system.

3.1.4 Hazards and Effects Management

Planned activities are reviewed to identify whether they have any significant HSE risks that cannot be adequately managed under normal operational controls. Activities identified as non-routine or higher risk are managed more intensively.

An Environmental Aspects Register is maintained for the site (in part 4 of the HSE Case), listing the activities that may affect the environment, their potential consequences and an assessment of their significance.

Finding:

- The structure of the Aspects Register generally meets the requirements of ISO14001. However, we identify a number of areas where the detail of register requires improvement in order that it identifies all environmental aspects and acts as an effective tool to help prioritise management controls and improvement initiatives. Examples of environmental aspects that are currently not fully addressed in the Aspects Register include:
    - Storage and management of fuel (only unrefined oil is considered). We note that there is bulk storage of diesel at the OPF and this should be specifically addressed in the Aspects Register.
    - Routine management of non-hazardous solid waste (this is currently only considered in the context of emergency events). Given on-going issues related to the adequacy of the Nogliki landfill and landfill capacity more generally on Sakhalin, we would expect this to be a high priority issue in the Aspects Register.
    - Control of ozone depleting substances.
    - Water abstraction/use.
    - Energy consumption.
    - Air emissions are identified as a low (C2) risk rating under the Aspects Register. Given the challenges of meeting Russian Federal Government Decree #7 on flaring of associated gas (see also below), we suggest that this risk rating should be re-evaluated.
- We **recommend** that the Aspects Register be fully reviewed and updated to ensure that it effectively addresses all environmental aspects.

3.1.5 Planning

The 2013 OPF Health, Safety and Environmental Plan (6000-S-90-04-P-0016-00-010) also contains the following plans for environmental management:

- Develop OPF Environmental Action Plan based on the Sakhalin Energy Corporate Environmental Plan.
- Provide updated inventory of emission sources for OPF and PMD to get relevant emission permits for operation.
- Ensure proper implementation of OPF Waste Management Plan (OPF Key Performance Indicators (KPI's)).
- Develop and implement Environmental Action Plan (inclusive of Legal, Lender and other adopted requirements) (2013 actions).
- Ensure regular inspection of chemical store and waste handling areas.
- Update the OPF Environmental Monitoring Plan 2013.
- Update the OPF Waste Management Plan 2013.
- Ensure timely production of the Industrial Environmental Monitoring Report for 2012.
- Implement the Energy Management Plan targeting energy efficiency and flaring (2013 actions).
- Ensure all gullies are clean and in good conditions.
- Dispose of legacy waste from the construction phase.

From the information gathered and interviews undertaken as part of the audit, it appears that adequate progress is being made against these objectives.

3.1.6 Implementation and Monitoring Performance

Activities are carried out in accordance with corporate and site policies and procedures, and non-routine or potentially hazardous activities are controlled using a Permit To Work (PTW) system.

A number of procedures have been implemented to cover the site's main environmental aspects such as the storage and use of chemicals and the storage and disposal of waste. In addition, procedures are used to ensure compliance with legal and other requirements, for example monitoring of releases to the environment. These are outlined in the OPF Industrial Environmental Control Programme (6000-S-90-04-P-7059-00-09).

The facility has a comprehensive and effective planned preventive maintenance system that is risk-based, thereby focusing resources on the most critical assets.

HSE records are maintained via a number of systems implemented at the OPF. These systems are also used to ensure that incidents and non-compliances are investigated and addressed.

3.1.7 Audit

Sakhalin Energy operates a Tiered HSE audit programme. The various levels of audit are described in the HSESAP and Sakhalin Energy's internal Compliance Assurance procedures (HSE Audit Procedure). In summary these include:

Level 1 – facility audits undertaken by 3rd parties e.g. lenders' IEC.

Level 2 – audit of a facility of activity performed by the Company e.g. Corporate HSE team.

Level 3 – self-assurance activities managed by the site, often with a system or process focus.

Level 4 – self-assurance activity to identify specific non compliances. These are often referred to as inspections.

The audits are scheduled within a rolling HSE Assurance Five Year Plan. A review of the five year Level 1 and 2 HSE audit programme identified that a Level 2 audit of the OPF was scheduled for 2013, however Corporate HSE reported to ENVIRON that this audit had been postponed to after ENVIRON's audit. Corporate HSE also stated to ENVIRON that the internal Sakhalin Energy auditor pool was currently under revision and that new training was planned for internal auditors.

Finding:

- The Sakhalin Energy HSE Assurance Management Standard states that Level 3 audit are *"self-assurance activities managed by asset/ project/ department/functions, with a system or process focus."*

  During the course of the audit, it was identified that the OPF HSE team considered that Level 3 audits would be undertaken by the Corporate HSE team and no Level 3 audits had been scheduled by the OPF for 2013. Subsequent discussions with the Corporate HSE team confirmed that Level 3 audits should be site managed self-assurance activities.

  ENVIRON did, however, identify a programme of monthly level 4 "inspections", undertaken in relation to hazardous materials and waste storage. The findings of these inspections were reviewed by ENVIRON and it was found that analysis was undertaken on the issues identified and that corrective actions were subsequently undertaken (i.e. where waste segregation or storage deficiencies were identified, additional waste training was delivered to those staff members incorrectly segregating or storing waste).
- We **recommend** that the OPF HSE Team manages and implements self-assurance Level 3 site audits (with input from the Corporate HSE team as necessary).

3.1.8 Management Review

HSE performance of the site against HSE plans is assessed on a quarterly basis by the site senior management. Topics covered by the review include:

- Previous review findings
- Any requirement to alter HSE policies or associated strategic objectives
- Impacts caused by activity, organisational or location changes
- Stakeholder, contractor and employee HSE concerns
- Evaluation of adequacy of HSE resources (including personnel)
- Audit findings
- Checking all HSE corrective actions have been appropriately implemented.
- Status of legal compliance

The aim of the review is to determine the effectiveness of the HSE-MS in managing risk and ensuring continual improvement.

3.1.9 Effectiveness of HSE-MS

The auditors conclude that the OPF has implemented a HSE-MS that meets the requirements of relevant international standards i.e. ISO 14001 and OHSAS 18001

Throughout the audit a strong HSE culture was very evident in all parts of the site and in staff at all levels.

3.2 Emissions to Atmosphere

3.2.1 Generators

Four Hitachi 25MW single cycle turbines are used to generate electrical power at the site (these comprise two 25MW dual-fuel gas/diesel turbines and two 25MW gas turbines). This electrical power is distributed to LUN-A and around the OPF.

The HSESAP states that the four turbines feature Dry Low NO_x Burners, Inlet Guide Valves (IGV) and Inlet Bleed Heating (IBH), and that therefore the turbines (when all running on 55-100% load on natural gas) stack emissions for NO_x are ≤ 50mg/m^3. However, 2013 annual NO_x emission monitoring results for the four turbines were supplied by the OPF and range from 52.3 mg/m^3 to 85.5 mg/m^3. The monitoring results also identified that carbon monoxide was not emitted during combustion by one turbine, this appears to be an erroneous result, since some carbon monoxide emission would be expected as a known by-product of gas combustion.

Finding:

- The air emissions from the four electricity turbines fall within the requirements of the HSESAP Air Emissions Standards Comparison, which forms part of the Air Emissions and Energy Management Standard (0000-S-90-04-O-0257-00-E). The HSESAP Air Emissions Standards Comparison identifies *51.3 mg/m^3 (25ppm) NO_x* as the maximum permitted emission level (as identified in the IFC EHS Guidelines 2007).

  From the emission results supplied to ENVIRON, the emissions from the electricity generating turbines at the OPF do not currently appear to comply with the NOx emission requirements of the HSESAP. In addition, carbon monoxide concentrations in the stack appear to be in excess of RF limits in some instances. However, full understanding of the nature of the results and any apparent exceedances of HSESAP/regulatory limits is difficult to determine on the basis of the available monitoring data. In particular, further details on the operating conditions under which the stack monitoring was undertaken are required.

- We **recommend** that Sakhalin Energy examines the turbine emission sampling method (including duration of the sampling and the operating parameters of turbines during the sampling), strategy and laboratory analysis quality. This should be undertaken to ensure that accurate emission data are obtained and in order that the nature and significance of any apparent non-compliance can be fully investigated.

Two of the above turbines are also capable of running on diesel and these are reportedly tested monthly on low-sulphur diesel for a period of two hours. No emissions monitoring data was available for these test periods, however the HSESAP incorporates an emission deviation statement to the effect that the RF technical passport emission standards will not be met when the turbines are run on diesel.

The OFP also incorporates two stand-by generators, both Caterpillar D3612 3.7MW diesel generators. In the event of a power failure of the main OPF turbines, one of these stand-by generators will provide emergency power to basic OPF systems and one will provide emergency power to the LUN-A offshore platform.

Given their period of operation (these stand-by generators are reportedly test-run for less than 200 hours annually); these generators are exempt from the IFC requirements for Small Combustion Processes.

3.2.2 Flaring and Venting

Sakhalin Energy is committed to no continuous flaring or venting (HSESAP *Air Emissions Standards Comparison*: 0000-S-90-04-O-0257-00-E). A flare system is installed at the OPF which is used for the safe disposal of gas during certain upset conditions and intermittent gas overheads (e.g. produced within the "parking loop" system) during normal operations.

Russian Federal Government Decree #7 came into force in 2012 and set a 95% utilisation limit for associated gas. The OPF is part of Sakhalin Energy's overall integrated system and so flaring is assessed at the Company level. At the time of the site visit, year to date (the end August 2013) cumulative flaring across all assets was 3.3 bscf, which is less than for the equivalent period in each of the previous three years.

During the audit, observed flaring was small and smokeless.

It was reported that no complaints have been received from the public in relation to flaring.

3.2.3 Fugitive Emissions

A remote leak detection system (comprising a series of gas sensors located across process trains one and two) is place for the detection of leaks. No significant fugitive emissions were identified during the walkover of the production area and the site representative reported that this absence of fugitive emissions was due to both the young age of the plant and also a detailed planned preventative maintenance program.

3.2.4 Monitoring

The HSESAP *Air Emissions Standards Comparison* requires annual monitoring of the air quality within the SPZ around the OPF process area. A review of the monitoring data for 2013 (covering NO_2, SO_2, CO, soot, methyl benzene and C1 – C5 hydrocarbons) identified that the air sampled at two locations within the SPZ met Russian Federation Air quality standards.

3.3 Water and Wastewater Management

3.3.1 Water Abstraction and Usage

The OPF has five groundwater abstraction wells located adjacent to the site, which are licenced under Russian Federation permit YuSH No 01 059 ET. However, two of these wells require maintenance works (due to being clogged with sand) and are not currently in use. Each well is equipped with a submersible pump capable for abstracting 24 m^3/hour of water.

Under the terms of the above permit, Sakhalin Energy is permitted to abstract 109,500 m^3 per quarter from the five wells identified above. Information provided during the audit revealed that only 15,000 – 18,000 m^3 is currently abstracted quarterly by the OPF. The

OPF is therefore operating well within its permitted abstraction limits and the site representatives did not report any concerns from in relation to the water use agreements for the OPF.

The abstracted water is sent to two site firewater tanks (one 3,100 m^3 and one 150 m^3) and also the site potable water system.

Water sent to the site potable water system is treated for use and stored within a 40m^3 holding tank. Recent alterations to this treatment system (comprising a filter update and dosing alterations) have resulted in treated water in Q3 2013 meeting the World Health Organisation (WHO) drinking water standard. While this water not currently used as potable water the site representatives reported that it was planned to use this water for cooking and cleaning within the PAO canteen, and that the possibility of providing this water to site staff as drinking water was being considered. We understand that monitoring of treated potable water will be in accordance with SanPiN (weekly monitoring of bacteriological and organoleptic parameters, and daily monitoring for residual chemical concentrations).

ENVIRON also notes the positive benefit that the introduction of the above process will reduce the reliance on bottled water at the site.

3.3.2 Wastewater Management

Closed Drain System

A closed drain system serves to collect hydrocarbon fluids from all normally pressurised or hazardous equipment. Liquids collected within this system are directed to the low pressure flare drum and then are collected for reprocessing or disposal.

MEG Drain System

Stormwater, runoff and drainage from areas that could potentially be contaminated with MEG are collected separately and drained towards a MEG sump. This collected liquid is then is then pumped from the sump back into a MEG tank or to the disposal water separation package.

Open Drain System

An open drain system is present within the process area of the OPF and collects all stormwater from process areas potentially contaminated with oil (including water from bunds, contaminated rain and snow, wash waters equipment open drains and firewater).

The open drain system passes to an open drain sump, where the water is tested for hydrocarbon content, with excess hydrocarbons removed using a disposal water separation package (including a hydrocyclone). This water is then sent to the water re-injection system. The open drain sump also contains a separation weir that can be used to hold oily water to allow separation to occur and for the hydrocarbon component to be removed when the disposal water separation package is backwashed/serviced. Oily waste generated by the open drain sump weir and the disposal water separation package is collected and disposed of as hazardous waste.

Stormwater Drain System

A stormwater drainage network serves the areas of the OPF that should not potentially be contaminated by hydrocarbons and other chemicals. This network drains to the site stormwater surge tank. The water within the stormwater surge tank is then tested for quality. If the quality is acceptable, the water is sent to the site potable water system (and potentially

from there to the firewater tanks) or discharged via the clean water ditches. If the quality is unacceptable, the water is sent to the disposal water separator package.

Process Wastewater Injection

Process wastewater generated via the disposal water separation package and from the MEG Regeneration process is discharged to two well water injection wells under a Russian Federation permit. The current system uses simple filters for the removal of total suspended solids (TSS), but requires the prior addition of freshwater to avoid exceeding the hydrocarbon discharge limits. Used cartridges cannot be recycled, unlike MEG filters, and contractor disposal is costly.

Finding:

- Sakhalin Energy is currently assessing options for the installation of an improved water treatment facility to resolve this issue. The current timeline for an upgraded system to be ready to operate is January 2018. In the interim, the Company is assessing whether it would be appropriate to request that the discharge limits for TSS and dispersed hydrocarbon set in the licence for the disposal well be increased.
- Given the nature of the deep water disposal wells, we note that this is a technical issue for to the performance of the well rather than an environment issue. We nonetheless **recommend** that results of injectivity studies are passed to ENVIRON as the lenders' IEC for review.

Sanitary Sewer Systems

Sewage generated in the PAO, OPF PMD and OPF process area is treated in an on-site sewage treatment plant ("STP"). Sewage is first collected in a surge tank and is then treated using maceration and biological treatment (where solids are also settled out). The biologically treated waters are then passed through a further set of effluent filters (to remove further solids) and are then passed through a UV steriliser prior to final disposal. Any final sludge present in the system after the UV steriliser is filtered out in a sludge filter and bagged for disposal.

A second STP, comprising a biological treatment plant treats kitchen, shower, mess-room, floor washing and laundry waste generated in the PAO.

The treated effluent from both these STPs is then discharged to ground via an open drainage ditch located to the north-east of the PAO (photo 1).

Monitoring Data

Finding:

- The HSESAP Water Use Discharge Standard: *Onshore Facilities Aqueous Discharges* Specification requires Sakhalin Energy to *"Collect, treat and as required and dispose wastewaters into properly designed, licensed and permitted disposal facilities in compliance with RF requirements, permit conditions and adopted international requirements"*.
- 2013 discharge monitoring data for the STPs identified permit discharge concentration exceedances against Russian Permit levels in relation to nitrate and BOD.
- Compliance sampling for the STPs appears to have been limited to a single sample for each monitoring period. A single sample may not be representative of the overall

system performance. ENVIRON therefore **recommends** that improvements to the sampling strategy be investigated, including consideration of the use of composite samples and/or sondes.

3.4 Waste Management

3.4.1 Waste Storage

Wastes arising around the site are separated into the five Russian Federation waste classes and stored at eleven small waste storage locations around the OPF processing area, the disused camp area and the PAO. These wastes are then collected on a daily basis and bulked together at the Temporary Waste Transit Area, which is located in the east of the site. Figure 4 shows these waste storage areas.

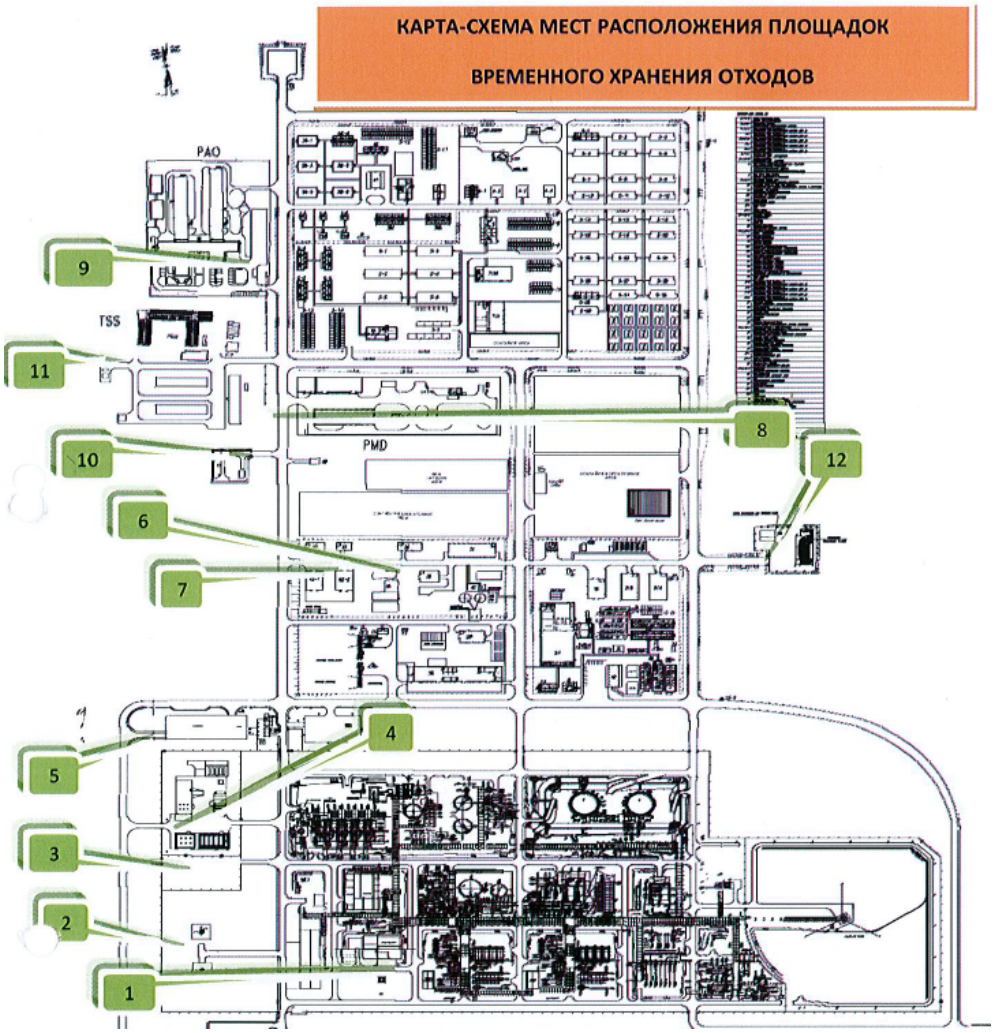

Figure 4: OPF Waste storage areas (Note that location 12 comprises the Temporary Waste Transit Area).

Bulk liquid waste items such as waste MEG are collected into Intermediate Bulk Containers (IBC's) at the point of generation and are delivered directly to the Temporary Waste Transit Area.

A review of a selection of the above waste storage areas identified them to be clean and well managed, with no wastes stored outside of designated containers and no containers

overflowing. Furthermore, an examination of the contents of the waste containers did not identify any incorrect disposal of waste. Wastes were not found to be stored outside of the eleven waste storage areas and from a general perspective, waste appeared to be well controlled at the site.

Waste oils and greases generated at the site (including the OPF PMD) are collected into 205 litre drums and are then disposed of into the condensate tanks at the site.

Storage facilities at the Temporary Waste Transit Area comprise a series of shipping containers used to store hazardous wastes and also three covered concrete bays used for the storage of waste wood, waste metal and waste cardboard. A series of covered concrete areas were also present, which were used to store empty drums and IBCs of waste MEG and other chemicals.

Non-hazardous wastes that are to be disposed of to landfill are not compacted on-site at the OPF. We understand that compaction is undertaken in the waste contractor's trucks that are used to remove the waste from site, although this was not verified during the audit.

Finding:

- Clause 6 of the Waste Containers, Labelling and Transport Specification, forming part of the Waste Management Standard (0000-S-90-04-O-0258-00-E) requires that "*all waste containers are provided with clear, dual language (Russian and English) labels detailing the waste type, waste hazard-classification, and any material specific health and safety considerations".*
- All the waste storage areas viewed by ENVIRON were found to be well labelled. However a small selection of drums located in the Temporary Waste Transit Area was found to be unlabelled.

It was also noted that a process had been introduced at the site to crush the waste plastic water bottles generated at the site and that these waste bottles were securely stored within sealed waste transport containers prior to removal.

3.4.2 Naturally Occurring Radioactive Material ("NORM")

Within the oil and gas industry, NORM can be generated as part of the pipeline pigging process and requires disposal as hazardous waste. Site staff reported that pigging waste was periodically tested for the presence of NORM and that the presence of NORM had not been detected within the pigging waste collected at the site. Staff training records for management of NORM were available for review and appeared to be current. Current calibration certificates were also available for the NORM testing equipment used at the site.

3.4.3 Waste Management Systems

The OPF HSE department maintains excellent waste tracking systems, which are used to monitor the amount of waste generated and stored on site and its disposal. A current Russian Federation Permit is held by the site, identifying the volume of each waste class that the OPF is permitted to dispose of. Analysis of waste disposal data shows that in 2012 the amount of waste generated was within the permitted limits for each of the five Russian waste classes.

It was reported that the logistics department checks the licences of waste carriers and waste disposal companies to ensure that waste is handled by competent and approved organisations in accordance with the requirements of the HSESAP.

Clinical waste from the site clinic is treated (through sterilisation) and disposed of by International SOS (ISOS), Sakhalin Energy's medical contractor at the OPF. ISOS then transports this waste to its main facility at Yuzhno-Sakhalinsk. Once at Yuzhno-Sakhalinsk, this waste is then reportedly sent to an incinerator.

Finding:

- The Waste Management Standards – Approved Waste Diversion and Disposal Facilities and the Waste Minimisation, Diversion and Disposal identify that Sakhalin Energy should *"inspect and approve all diversion, treatment and disposal facilities used for Sakhalin Energy Wastes prior to use"* and that such facilities *"should meet the requirements of the Project Specifications"*.

  The clinical waste incineration facility used by ISOS has not been inspected or Sakhalin Energy.

- We **recommend** that Sakhalin Energy includes audit of the incineration disposal route for clinical wastes as part of its audit of ISOS.

The waste management coordinator has received specialist training in waste management and copies of her training certificates and of others who assist with site waste management are held on file.

3.4.4 Waste Minimisation

Most waste streams generated by the OPF are sent for off-site disposal, mostly via landfill. However, some wastes are recycled or reused such as:

- waste lube oil. This process commenced in 2013 and the OPF is currently in the process of creating a permanent facility for the injection of waste lube oil into the condensate tanks present on-site. In 2012, the facility sent approximately 5.5 tonnes of waste oils off-site for disposal;
- waste metal (removed by specialist contractor for recycling);
- waste wood (given to local people); and
- waste water bottles are compacted and then stored in shipping containers prior to recycling.

Suggestion:

- An examination of the wood to be passed to local people identified that some had been treated, potentially with various forms of wood preservative. Should this preserved wood be burnt, a potential exists for the release of toxic substances (e.g. arsenic). It is therefore suggested that Sakhalin Energy reviews the usage of the wood by the public and if wood is used for burning then treated and untreated waste wood should be separated so that only untreated wood is passed to local people for burning.

3.5 Management of Hazardous Materials

3.5.1 Bulk Storage of Oils and Hazardous Materials

Two condensate tanks are located on-site, with a combined capacity of 7,949 m^3. These are contained within a bund that was reported to be able to hold 150% of the largest tank/container and at least 25% of the combined capacity of both tanks. In addition, the site

representatives reported that the tanks were never more than 50% full as, condensate was generally injected into the oil pipeline passing through the site at the time of production (and hence the tanks only comprised a reserve storage option).

Two MEG storage tanks are also present at the site, one of 1,600 m^3 for the interim storage of MEG ready for re-use and one of 3,041 m^3 for the storage of MEG ready for reclamation. Both of these tanks were noted to be located within a secondary containment bund that appeared to be sized to contain 150% of the largest tank/container and at least 25% of the combined capacity of both tanks.

Suggestion:

- Spills from the MEG storage tanks would be captured within the bund. However, the bund does not have an in-built system to enable the bund to be drained to an isolation tank. We suggest that written procedures are developed to address how MEG would be removed from the bund in the event of a spill.

A 120 m^3 diesel storage tank was also noted to be present at the site; this was also noted to be located within secondary containment that would hold 110% of the tank volume. This larger tank also fed two smaller tanks approximately 3 m^3 in volume and located adjacent to each of the two emergency generators at the site. Each of these smaller tanks was also noted to be located within suitably sized secondary containment.

All bulk storage containers are inspected regularly by the maintenance department.

3.5.2 Small Scale Chemical Storage

All small-scale chemical storage facilities inspected as part of the audit were found to utilise appropriate secondary containment for items such as 205 litre drums and IBCs.

3.5.3 Asbestos

It was reported that no asbestos is used at the OPF, either in the fabric of buildings or in equipment. An asbestos survey was not undertaken as part of the audit.

3.5.4 PCBs

It was reported by the environmental engineer that no electrical equipment at the OPF contains polychlorinated biphenyls (PCBs).

3.5.5 Ozone Depleting Substances

An inventory is maintained of all equipment containing ozone depleting substances, as required by Clause 11 of the *Air Emissions and Energy Management Standard* Overview (0000-S-90-04-O-0257-00-E). The following refrigerants are used:

Table 1: Summary of Ozone Depleting Substances

Substance	Description	Total On-Site	ODP
R22	Hydrochlorofluorocarbon (HCFC)	220	0.05
R407C	Hydrofluorocarbon (HFC) blend	312	0

R410A	Hydrofluorocarbon (HFC) blend	19.3	0

The only refrigerant used at the site which is an ozone depleting substance is R22, which has a low ODP of 0.05. R22 is being phased out in much of the world and in the EU it is scheduled for phase-out in December 2014. The Sakhalin Energy Air Emissions and Energy Management Standard, which requires the elimination of ozone depleting substances, does not apply to domestic-sized appliances. The inventory shows that R22 is only used in small equipment, typically individual room air conditioning plant (normally containing between 2.5kg and 8kg of R22).

Suggestion:

- Although the use of R22 in domestic-sized equipment is permitted by Sakhalin Energy it is suggested that alternatives are considered (R417A is a drop-in replacement for R22 and has an ODP of zero). Given the large number of units across all Sakhalin Energy assets that contain ozone depleting substances, ENVIRON suggests that consideration be given to undertaking the replacement of ODS on a corporate level.

3.6 Noise

No significant sources of environmental noise were identified during the audit. Occupational noise monitoring data was provided to ENVIRON during the course of the audit, which identified areas with elevated noise levels and where hearing protection would be required. ENVIRON observed that hearing protection is provided to personnel working in these areas.

3.7 Soil and Groundwater Contamination

There are a number of potential sources of ground contamination at the OPF, including:

- loss of containment in bulk storage tanks (diesel, MEG and condensate);
- loss of containment at oil and chemical storage locations;
- loss of containment in waste storage areas;
- leaks of hazardous substances from plant and equipment; and
- loss of containment of the drainage networks.

Issues associated with loss of containment and leaks are covered in other sections of this report.

Groundwater monitoring is carried out at 21 monitoring boreholes around and outside the OPF. Water samples are collected twice annually. Water samples are taken from 13 groundwater wells located on the OPF boundary, from three wells located at the temporary waste storage area and from two wells located near the permanent snow storage area. These samples are analysed for Petroleum Products, Phenol(s), synthetic surfactants, formaldehyde, toluene, elthylbenzene, benzene, xylene, monoethylene glycol and pH. Samples taken from wells down-gradient of the Emergency Response and Restoration Site, down gradient of the PAO and down gradient of the wastewater discharge area are additionally analysed for phosphates (expressed as phosphorus), coliforms (total content) and total BOD. Groundwater well monitoring locations are shown in Figure 5.

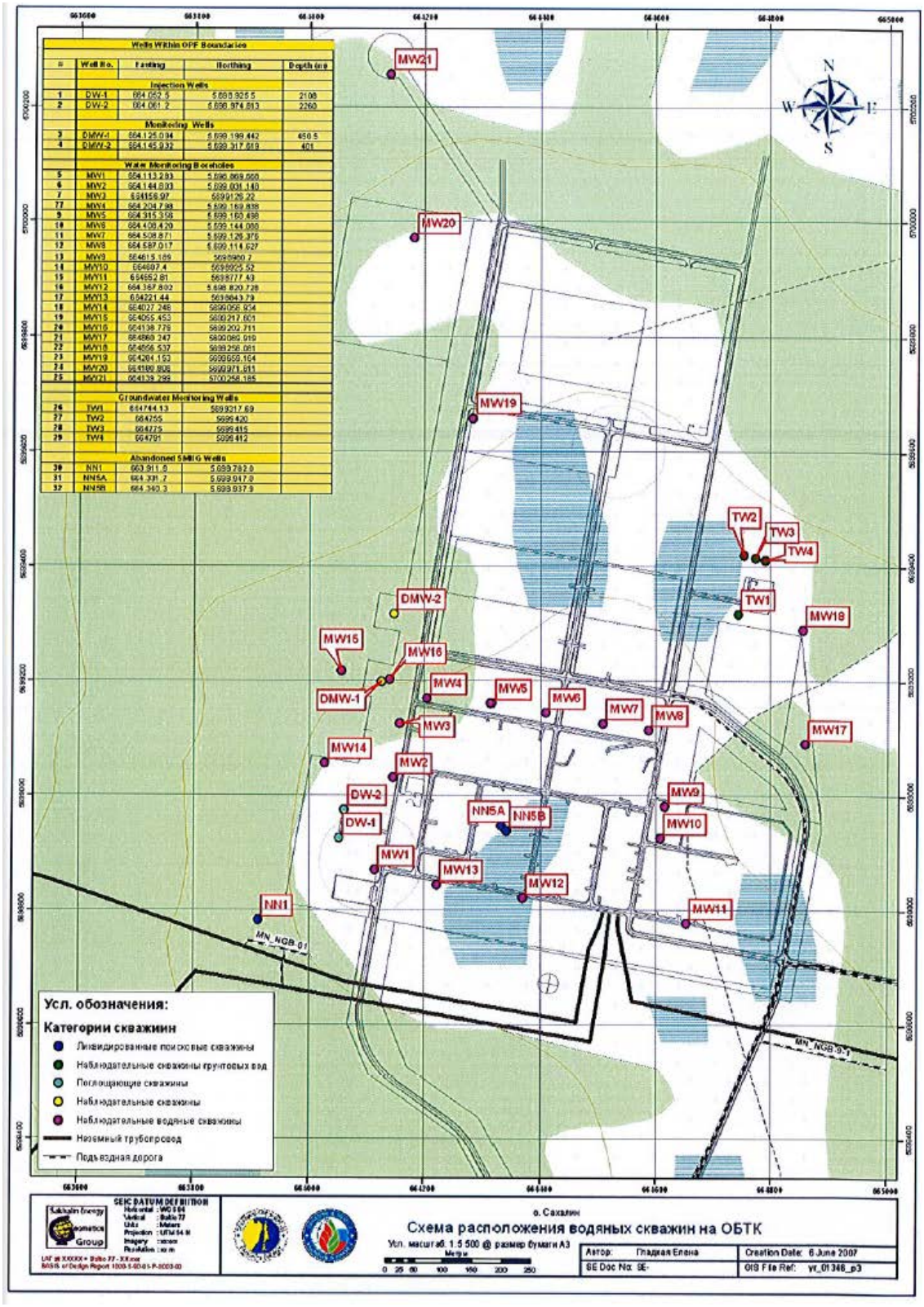

Figure 5: Groundwater Monitoring Well locations.

Groundwater monitoring data are reviewed by the corporate Sakhalin Energy team to assess whether any significant changes to groundwater conditions have occurred. No such changes have reportedly been identified, although analysis reports were not available for inspection at the time of the site visit.

3.8 Housekeeping

In general housekeeping is excellent around the site. Opportunities for improving housekeeping in chemical and waste storage areas were noted, as detailed in sections 3.4 and 3.5 of this report.

3.9 Health and Safety

While health and safety is considered outside the scope of this audit, several examples of good practice were observed such as:

- use of appropriate PPE by all personnel;
- clear safety signage in Russian and English;
- excellent barriers around hazardous areas; and
- detailed and clear health and safety induction training for site visitors.

As part of the audit, ENVIRON undertook a brief review of the Permit To Work System in place at the site. This was found to follow the international Standard “ISSOW” Integrated Safe System of Work. This permit to work system was found to work well, with permitted work controlled via a computer based system. A review of two permitted activities found agreed and documented safe systems of work to have been implemented and approved by certified competent persons prior to the undertaking of the activities.

Suggestion:

- ENVIRON did, however, note that prerequisite individual training (e.g. in the use lifting equipment for staff assigned lifting tasks) was not automatically checked as part of the grant of the permit to work, but relies upon self-declaration as part of the toolbox talk prior to undertaking the task. In order to reduce the potential for error in this process, ENVIRON suggests that the permit to work approval process be modified to ensure that individual training requirements are automatically checked as of the grant of the permit to work.

4 Conclusions

Overall ENVIRON considers that environmental performance at the OPF is very good. There is a robust and well implemented HSE management system in place, and there is evidence of a strong environmental management culture at the facility. However, while there was a generally good level of compliance with environmental law and the requirements of the HSESAP, the following Findings were identified:

- HSE Management Systems
  - The structure of the Aspects Register generally meets the requirements of ISO14001. However, we identify a number of areas where the detail of register requires improvement in order that it identifies all environmental aspects and acts as an effective tool to help prioritise management controls and improvement initiatives. Examples of environmental aspects that are currently not fully addressed in the Aspects Register include:
    1. Storage and management of fuel (only unrefined oil is considered). We note that there is bulk storage of diesel at the OPF and this should be specifically addressed in the Aspects Register.
    2. Routine management of non-hazardous solid waste (this is currently only considered in the context of emergency events). Given on-going issues related to the adequacy of the Nogliki landfill and landfill capacity more generally on Sakhalin, we would expect this to be a high priority issue in the Aspects Register.
    3. Control of ozone depleting substances.
    4. Water abstraction/use.
    5. Energy consumption.
    6. Air emissions are identified as a low (C2) risk rating under the Aspects Register. Given the challenges of meeting Russian Federal Government Decree #7 on flaring of associated gas (see also below), we suggest that this risk rating should be re-evaluated.
  - During the course of the audit, it was identified that the OPF HSE team considered that Level 3 audits would be undertaken by the Corporate HSE team and no Level 3 audits had been scheduled by the OPF for 2013. Subsequent discussions with the Corporate HSE team confirmed that Level 3 audits should be site managed self-assurance activities.
- Emissions to Atmosphere
  - Stack emission monitoring data supplied to ENVIRON indicates that in some instances emissions from the electricity generating turbines at the OPF are in exceedance of RF limits for CO and HSESAP requirements for NOx. However, full understanding of the nature of the results and any apparent exceedances of HSESAP/regulatory limits is difficult to determine on the basis of the available monitoring data. In particular, further details on the operating conditions under which the stack monitoring was undertaken are required.

- Wastewater Management
  - Sakhalin Energy is currently assessing options for the installation of an improved water treatment facility to resolve this issue. The current timeline for an upgraded system to be ready to operate is January 2018. In the interim, the Company is assessing whether it would be appropriate to request that the discharge limits for TSS and dispersed hydrocarbon set in the licence for the disposal well be increased.
  - 2013 discharge monitoring data for the STPs identified permit discharge concentration exceedances against Russian Permit levels in relation to nitrate and BOD.
- Waste Management
  - Wastes stored at the waste storage areas viewed by ENVIRON were found to be well labelled. However a small selection of drums located in the Temporary Waste Transit Area was found to be unlabelled. Furthermore, within one shipping container used to store hazardous wastes, the MSDS for the waste material was found to be present only in Russian and not also in English.
  - The clinical waste incineration facility used by ISOS has not been inspected or approved by Sakhalin Energy.

In addition, a number of suggestions to improve performance have been highlighted in this audit report as follows:

Suggestions:

- If water from the potable water treatment plant is to be used in food preparation, then we suggest that the monitoring of water quality from the plant be reviewed and in particular consideration given to increased frequency of monitoring of the potable water quality parameters.
- An examination of the wood to be passed to local people identified that some had been treated, potentially with various forms of wood preservative. Should this preserved wood be burnt, a potential exists for the release of toxic substances (e.g. arsenic). It is therefore suggested that reviews the usage of the wood by the public and if wood is used for burning then treated and untreated waste wood should be separated so that only untreated wood is passed to local people for burning.
- Spills from the MEG storage tanks would be captured within the bund. However, the bund does not have an in-built system to enable the bund to be drained to an isolation tank. We suggest that written procedures are developed to address how MEG would be removed from the bund in the event of a spill.
- Although the use of R22 in domestic-sized refrigeration equipment is permitted by Sakhalin Energy it is suggested that alternatives are considered (R417A is a drop-in replacement for R22 and has an ODP of zero). Given the large number of units across all Sakhalin Energy assets that contain ozone depleting substances, ENVIRON suggests that consideration be given to undertaking the replacement of ODS on a corporate level.
- ENVIRON suggests that the permit to work approval process be modified to ensure that individual training requirements are automatically checked as of the grant of the permit to work.

Annex A: Photographic Log

Photo 1. Stormwater Discharge Point SWO-5

Photo 2. Waste cardboard, wood and metal at the Temporary Waste Transition Area

Title:	Photographic Log	**Client:**	Sakhalin-2 (Phase 2) Project Finance Parties
Site:	Onshore Processing Facility	**Date:**	October 2013

Photo 3. Compacted waste drinking water bottles and different types of plastic waste for further re-cycling.

Photo 4. Hazardous waste storage

Title:	Photographic Log	**Client:**	Sakhalin-2 (Phase 2) Project Finance Parties
Site:	Onshore Processing Facility	**Date:**	October 2013

Photo 5. Dual-language waste labelling

Photo 6. Stormwater discharge point on the north-east site boundary

Title:	Photographic Log	**Client:**	Sakhalin-2 (Phase 2) Project Finance Parties
Site:	Onshore Processing Facility	**Date:**	October 2013

Annex B: OPF Summary Findings

Findings Log							
Ref	**Rank**	**Status**	**Date**	**Topic**	**HSESAP Ref:**	**Finding**	**Action Progress Review**
GEN.05	Blue (B1)	New	Oct 2013	HSE Management Systems	0000-S-90-04-O-0015-00-E Appendix 1	During the course of the audit, it was identified that the OPF HSE team held the expectation that level 3 audits would be undertaken by the Corporate HSE team and no Level 3 audits had been scheduled by the OPF for 2013. Subsequent discussions with the Corporate HSE team identified that confirmed that Level 3 audits should be site managed self-assurance activities.	**Action**: Undertake audit level re-training for Sakhalin Energy OPF HSE staff and implement program of OPF level 3 audits.
GEN.05	Blue	New	Oct 2013	HSE Management Systems		The structure of the Aspects Register generally meets the requirements of ISO14001. However, we identify a number of areas where the detail of register requires improvement in order that it identifies all environmental aspects and acts as an effective tool to help prioritise management controls and improvement initiatives. Examples of environmental aspects that are currently not fully addressed in the Aspects Register include: • Storage and management of fuel (only unrefined oil is considered) • Routine management of non-hazardous solid waste • Control of ozone depleting substances • Water abstraction/use • Energy consumption • Air emissions (re-evaluate risk rating	**Action:** Review and update Aspects Register

Findings Log							
Ref	**Rank**	**Status**	**Date**	**Topic**	**HSESAP Ref:**	**Finding**	**Action Progress Review**
						given RF decree #7 on flaring	
AIR.11	Low Amber (C3)	New	Oct 2013	Emissions to Atmosphere	0000-S-90-04-O-0257-00-E Appendix 4	From the emission results supplied to ENVIRON, the emissions from the electricity generating turbines at the OPF do not currently appear to comply with the NOx emission requirements of the HSESAP. In addition, carbon monoxide concentrations in the stack appear to be in excess of RF limits in some instances. However, full understanding of the nature of the results and any apparent exceedances of HSESAP/regulatory limits is difficult to determine on the basis of the available monitoring data. In particular, further details on the operating conditions under which the stack monitoring was undertaken are required.	**Action**: It is recommended that Sakhalin Energy examine the power turbine emission sampling method, strategy and laboratory analysis quality. This should be undertaken to ensure that accurate emission data is obtained.
WATER.13	Low Amber (C3)	New	Oct 2013	Wastewater Management	0000-S-90-04-O-0255-00-E Appendix 7	2013 discharge monitoring data for the STPs identified permit discharge concentration exceedances against Russian Permit levels in relation to Nitrate and Biological Oxygen Demand (BOD). Compliance sampling for the STPs is reportedly limited to a single sample in each period, which may not provide representative results.	**Action**: ENVIRON therefore recommends that an amended sampling strategy be devised for sampling the effluent discharged from the STPs. Such a strategy may include the use of equipment such as composite samplers, which reduce the significance of individual results which may not be representative of overall system performance.
See H&S.10	Blue (B1)	Open	Oct 2013	Waste Management	0000-S-90-04-O-0258-00-E Appendix 10	All the waste storage areas viewed by ENVIRON were found to be well labelled, however a small selection of drums located	**Action**: Ensure that all hazardous wastes are appropriately labelled in both Russian and English.

Findings Log							
Ref	**Rank**	**Status**	**Date**	**Topic**	**HSESAP Ref:**	**Finding**	**Action Progress Review**
						in the Temporary Waste Transit Area not found to be labelled.	
WASTE.19	Low Amber (C3)	New	Oct 2013	Waste Management	0000-S-90-04-O-0258-00-E Appendix 9	The clinical waste incineration facility used by ISOS has not been inspected by Sakhalin Energy.	**Action**: Sakhalin Energy includes audit of the incineration disposal route for clinical wastes as part of its audit of ISOS.

Annex C: Documentation Provided

List of Key Documentation Reviewed

1. Sakhalin Energy Investment Company – Environmental Impact Assessment, Volume 3, Chapter 1.
2. Sakhalin Energy Investment Company – Environmental Impact Assessment, Volume 3, Chapter 2.
3. Onshore Production Facility HSE Case (6000-S-90-04-T-0001-00-03)
4. Contracting and Procurement Procedure (000-S-90-04-P-0029-00-E)
5. HSES-SP Management of Contracts Procedure (000-S-90-04-P-0029-00-E).
6. HSE Management of Contracts Standard (0000-S-90-04-O-0013-00-E).
7. The OPF Health, Safety and Environment Plan 2013 (6000-S-90-04-P-0016-00-01)
8. OPF Industrial Environmental Control Programme (6000-S-90-04-P-7059-00-09)
9. Ozone depleting substance inventory
10. Electrical turbine air emission monitoring results.
11. OPF Waste Water Treatment Status Update
12. Russian Register MS Surveillance Audit report.
13. 5 year HSE Audit Programme – Level 1 and 2

Annex D: Itinerary and Auditees

Itinerary

3rd October	HSE Induction
	Kick-off meeting with senior management representatives
	Review of HSE Management processes
	Review of waste management facilities
	Visit to surface water sampling location
	Review of groundwater quality monitoring
	Visit to waste management facilities
	Visit to disused BETS construction camp
4th October	Walkover and orientation of process area
	Review of air emissions performance
	Review of water emissions performance
	Visit to water discharge monitoring points
	Meetings with several auditees
	(Visit to OPF PMD – part of the Monitoring visit and not included in the audit)
	(Visit to Medical Facilities – part of the Monitoring visit and not included in the audit)
5th October	Meetings with HSE department
	Close out meeting and Findings

Auditees

The primary auditees are listed in the table below

Role
HSE Assurance Manager, Corporate HSE
OPF Operational Installation Manager
OPF Head of HSE
OPF Environmental Engineer