ZHAIKMUNAI

Environmental, Health & Safety Due Diligence
Exploration & Production Facility Expansion
June 2009
By AMEC Earth & Environmental UK Ltd.

ZHAIKMUNAI

Environmental, Health & Safety Due Diligence Assessment
Exploration & Production Facility Expansion
June 2009

Submitted by:
AMEC Earth & Environment UK Ltd.
Trinity Place, 29, Thames Street, Weybridge, Surrey.
Final Report: RW014 - September 2007

Zhaikmunai LLP

Environmental, Health & Safety Due Diligence

Exploration & Production Facility Expansion

Chinarevskoye Field, Kazakhstan

June 2009

Submitted by: AMEC Earth & Environmental

Final Report: RW014

15 June 2009

Zhaikmunai LLP
7th Floor
Anglo International House
Lord Street
Douglas, Isle of Man
IM1 4LN

Attn: Mr Kai-Uwe Kessel

Our Reference: 5879000397

Dear Mr Kessel

RE: Facility Expansion, Chinarevskoye Field, Kazakhstan

Please find enclosed AMEC's environmental, health and safety due diligence assessment undertaken in relation to the potential project financing of Zhaikmunai's Chinarevskoye Field exploration and production, Kazakhstan.

Jennifer McCraight
Main Author
15 June 2009

Gavin Cuthbert
Final Review & Authorisation
15 June 2009

AMEC Earth & Environmental UK Ltd
International Industrial Due Diligence Head Office
1 Trinity Place, 29 Thames Street
Weybridge, Surrey
United Kingdom, KT13 8JG
Tel +44 (0) 1932 835100 Fax +44 (0) 1932 835119

LIMITATIONS AND EXCEPTIONS: AMEC has prepared this report solely for the benefit of Zhaikmunai LLP and related subsidiaries/affiliates in accordance with generally accepted consulting practices and for the intended purposes. This report may not be relied upon by any other party without explicit written agreement of AMEC. No other warranty, expressed or implied, is made as to the professional advice included in this report. Unless otherwise stated in this report, the assessment made an assumption that the site will continue to be used for its current purpose without significant change. This report does not constitute legal advice. In addition, AMEC makes no determination or recommendations regarding the decision to purchase, sell, or provide financing. Where assessments of systems, works or costs required to repair, reduce or mitigate any technical, health and safety and/or environmental issue identified in this report are made, such assessments are based upon information available at the time and are subject to further investigations or information which may become available. Costs may therefore vary outside the ranges quoted. No allowance has been made for changes in prices or exchange rates or changes in any other conditions, which may result in price fluctuations in the future. Where assessments of systems, works or costs necessary to achieve compliance have been made these are based upon measures which, in AMEC's experience, could normally be negotiated with the relevant authorities under present legislation and enforcement practice, assuming a pro-active and reasonable approach by site management.

EXECUTIVE SUMMARY

AMEC Earth & Environmental UK Ltd (AMEC) was commissioned by Zhaikmunai LLP (the Company) to undertake an independent environmental, health and safety (EHS) evaluation of their current and proposed oil and gas exploration and production facilities in the North-west region of the Republic of Kazakhstan (RoK) in the Chinarevskoye Field.

The EHS evaluation comprised of:

- EHS audit of existing facilities to assess compliance with applicable local and international regulations; and
- EHS analysis of the proposed expansion, in order to identify potential impacts and mitigation measures.

The primary objective of the evaluation was to assess compliance of existing and proposed facilities/operations with the European Bank of Reconstruction and Development's (EBRD) Environmental and Social Policy, 2008 (the Policy).

AMEC's EHS evaluation incorporated the following Zhaikmunai assets/operations:

- Exploratory drilling activities;
- Production well status;
- Abandoned well status;
- Water well status;
- Oil Treatment Unit (OTU);
- Demercaptanization Unit at the OTU;
- Oil Pipeline from Chinarevskoye Field to rail connection near Uralsk; and
- Oil Terminal near Uralsk.

Zhaikmunai's current operations include an OTU, a Demercaptanization unit, multiple oil gathering and transportation lines distributed across the Chinarevskoye Field, a gas powered electricity generation system and warehouse facilities (adjacent the OTU) for the storage of oil, materials, machinery and chemicals used in crude processing.

At present, oil from the production wells is fed to the central OTU where gas and oil are separated through a 3-stage heat treatment system. Gas is flared and the oil is transported to an oil loading terminal for export by rail via a 120km oil pipeline.

In order to increase production and longevity of the Field and to ensure regulatory compliance, several expansion projects are underway.

The construction of a gas treatment plant (GTP) with three gas treatment units has been commissioned for full utilisation of the associated gas produced by Zhaikmunai, so as to eliminate gas flaring.

In association with the GTP, a 15 km gas pipeline is currently being constructed, which will transport gas from the GTP to the Intergas Central Asia gas pipeline for supply to the local market. A LPG terminal is also planned for construction after 2010 next to the oil terminal and will be used to export LPG by rail.

Zhaikmunai also plan to extend the OTU which will double the production capacity of operations. To ensure continued production at the Field, the Company are also constructing a water re-injection plant to maintain reservoir pressure and enhance production yields.

The specific objectives of the audit were to identify environmental, health and safety compliance and, where possible, quantify:

- Regulatory compliance (Existing Kazakhstan Legislation and International requirements);
- Exposure to new/potential liabilities; and
- Levels of investment required to meet emerging nationals and international standards.

AMEC undertook the assessment following an internationally recognised approach incorporating the five elements listed below.

- Project Strategy Agreement;
- Document Review;
- Site Visits;
- Zhaikmunai Staff Discussions; and
- Regulatory Discussions.

Environmental Compliance Status of Current Facilities

The performance of the Company is, for the most part, in compliance with national and international regulations and standards associated with onshore oil and gas production. Only minor areas of non-compliance associated with hazardous materials storage, hazardous waste storage, radioactive waste testing and secure fencing were identified. These areas of non-compliance are of a basic nature and will not require complex mitigation.

There have been no investigations or testing of radioactive waste at Zhaikmunai facilities since a primary investigation was undertaken in 2006 by the Ministry of Health of RoK. To rectify this situation Zhaikmunai have contracted a firm, Volkovs

Geologiya, to undertake a full investigation of radioactive waste at all Zhaikmunai facilities and carry out quarterly inspections throughout 2009.

During the regulatory authority inspection by the Ministry of Environmental Protection (MEP) in 2009, two violations were identified for the mixing of hazardous waste with domestic waste and the burning of domestic waste. Practices such as these are not compliant with Environmental legislation in RoK and therefore AMEC recommends that dedicated enclosed storage containers be purchased for each type of hazardous waste as an obligatory measure (in accordance with IFC guidelines) and the practice of burning of domestic waste be eliminated.

Several operational facilities, namely exploratory wells and the temporary Field camp, were identified as lacking a secure perimeter border. To ensure compliance with IFC EHS guidelines for onshore oil and gas developments (2007) AMEC recommends that all operational facilities at the Chinarevskoye Field be contained using secure perimeter fencing.

It was noted that there are no drains within the storage warehouses, no spill kits and no secondary containment in the case of a spill. AMEC recommends that a robust method of secondary containment, such as a 6-12" concrete lip/bund be installed to the floor around the warehouse perimeter as an obligatory measure to protect against any spills or leaks.

Health and Safety Regulatory Compliance Status

The health and safety status of Zhaikmunai was found to be compliant with the current activities undertaken as governed by Kazakh legislation specific to the oil and gas industry.

Zhaikmunai were found to be in compliance with the Oil and Gas Inspection Regulations 1996. A list of the documents presented to AMEC is listed in Appendix O.

AMEC found the operational activities to be undertaken to a high standard. One obligatory requirement was identified which is associated with the requirement to undertake a survey of radiation exposure of personnel. This can be addressed during the radioactive waste survey which has already been scheduled for 2009 by Zhaikmunai.

TABLE OF CONTENTS

Figures

Tables

Appendices

1 INTRODUCTION

AMEC Earth & Environmental UK Ltd (AMEC) was commissioned by Zhaikmunai LLP (the Company) to undertake an independent environmental, health and safety (EHS) evaluation of their current and proposed oil and gas exploration and production facilities in the North-west region of the Republic of Kazakhstan (RoK).

The EHS evaluation comprised of:

- EHS audit of existing facilities to assess current performance and compliance with applicable local and international regulations; and
- EHS analysis of the proposed expansion, in order to identify potential impacts and mitigation measures.

1.1 Nature of the Project

Zhaikmunai LLP (the company) is an independent oil and gas enterprise currently engaging in the exploration, production and sale of crude oil and gas condensate in the North-western region of RoK. Zhaikmunai's Field and licence area is the Chinarevskoye Field (the Field), located in the northern part of the oil-rich Pre-Caspian Basin.

The Chinarevskoye Field, approximately 322.4 km^2 in size, is located in the province of Batys Kazakhstan, near the international border with the Russian Federation, and close to several major pipelines. The west Kazakhstan administrative centre of Uralsk lies approximately 80 km South-west of the Chinarevskoye Field. There are 58 km of asphalt road and 20 km of gravel road between Uralsk and the company's OTU. The Oil Terminal is located 20 km North-west of Uralsk.

Zhaikmunai's current operations include an oil treatment unit/facility (OTU) capable of processing 400,000 tonnes per annum of crude oil, multiple oil gathering and transportation lines distributed across the Chinarevskoye Field, a gas powered electricity generation system and warehouse facilities (adjacent the OTU) for the storage of oil, materials, machinery and chemicals used in crude oil production.

Zhaikmunai has also constructed a 120 km oil pipeline from the Chinarevskoye Field OTU to a rail connection near Uralsk, along with a new receiving oil loading terminal at the rail connection.

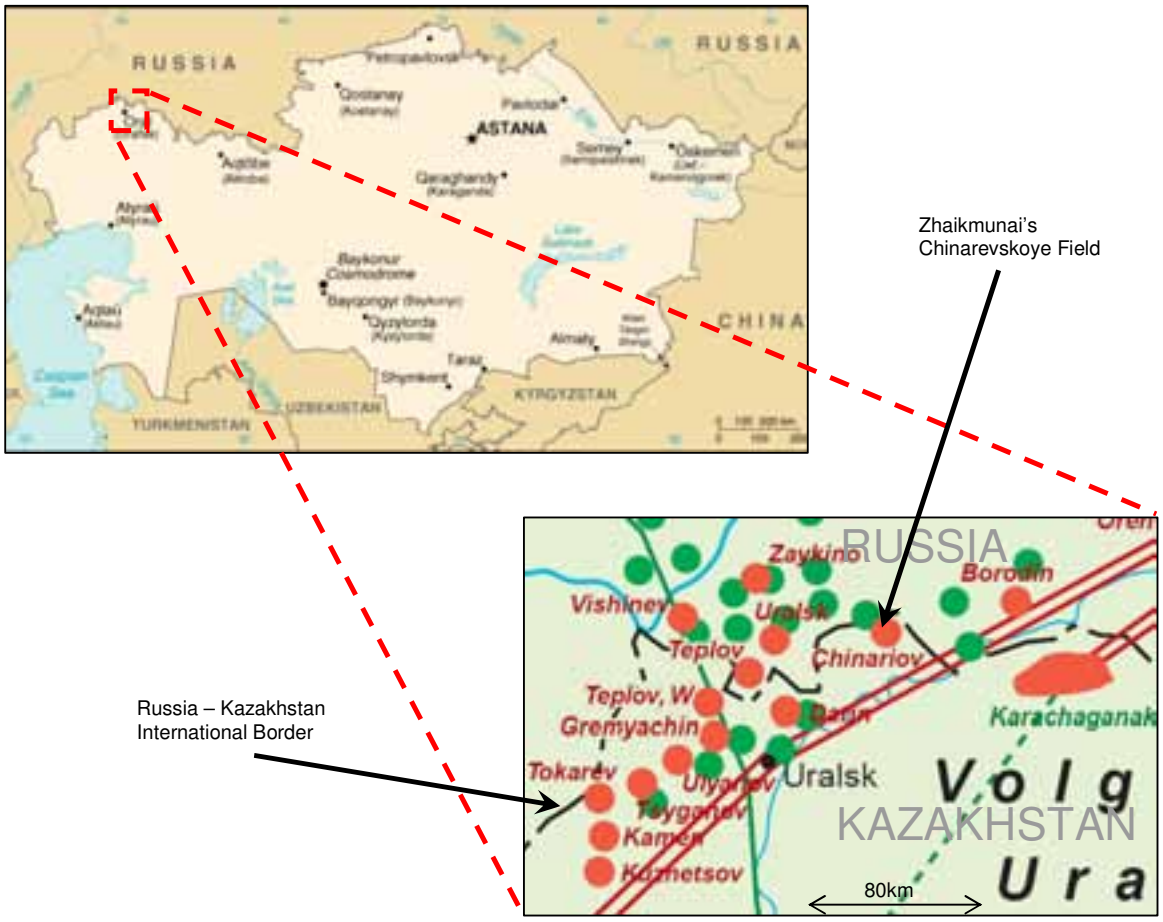
The construction of a gas treatment plant (GTP) with three gas treatment units has been commissioned for full utilisation of the associated gas produced by Zhaikmunai,

which is essential for its continued crude oil production, and the treatment of gas condensate to produce dry gas for sale from 2009.

In association with the GTP, a 15 km gas pipeline is currently being constructed, which will transport gas from the GTP to the Intergas Central Asia gas pipeline for supply to the local market. A LPG terminal is also planned for construction after 2010 next to the Oil Terminal and will be used to export LPG by rail.

Zhaikmunai also plan to extend the OTU, by constructing an additional demurcaptanization plant with associated infrastructure and an additional oil storage tank with a capacity of 500,000m³, which will double the production capacity of operations. To ensure continued production at the Field, the Company are also constructing a water re-injection plant to maintain reservoir pressure and enhance production yields.

Figure 1: Location of Zhaikmunai's Operations



AMEC's EHS evaluation incorporated the following Zhaikmunai assets/operations:

- Exploratory drilling activities;
- Production well status;
- Abandoned well status;
- Water well status;
- Oil Treatment Unit (OTU);
- Demercaptanization Unit at the OTU;
- Oil Pipeline from Chinarevskoye Field to rail connection near Uralsk; and
- Oil Terminal near Uralsk.

1.2 Historical Field Operations

Historically, Uralsk Oil and Gas Exploration Expedition (UNGG) commenced exploratory drilling activities within the Field in the mid-1960s, including the drilling of two wells to depths of 4566 m and 3595 m.

UNGG continued testing and exploration works 1989-1993. During the exploration works, six wells were drilled to various oil depths/horizons. In 1991 industrial capacity inflow of gas condensate was received in Well 4 from a depth range of 5145 – 5171 m.

In 1992 the industrial productivity of the Biysky horizon (5119 – 5097m) was approved in Well 10 (5210m). Gas condensate inflow was received from the Afonian horizon. Furthermore, the Tunisian layers were proven to contain oil. Drilling ceased in 1993 due to a lack of government funds and Well 10 was conserved.

In May 1997, Zhaikmunai was granted an exploration and production licence with respect to the Field and in October 1997 Zhaikmunai entered into an associated Production Sharing Agreement (PSA) with the Republic of Kazakhstan. Zhaikmunai's crude oil production began in October 2000.

Zhaikmunai was established on the 20 March 1997 by "Condensate-Holding" LLP (Kazakhstan) and "First International Oil Corporation" (USA) to exploit the Chinarevskoye gas and condensate Field located in the North-western region of RoK. Furthermore, in September 2004, Probel Capital Management N.V. (Belgium), through Tensor Buy Out Fund, an investment vehicle organised to make equity investments in the emerging markets of CIS in the oil and gas industry became an investor in Zhaikmunai.

1.3 Description of Current Field Operations/Facilities

In June 2008, Zhaikmunai announced six commercial discoveries in the Chinarevskoye Field following the submission of the relevant declarations to the Kazakh Ministry of Energy and Mineral Resources (MEMR) on 19 May 2008. As a result of these submissions, on 17 November 2008 the MEMR signed a supplementary agreement to Zhaikmunai's original Production Sharing Agreement, thereby extending its licence for a further three-year period.

The Company currently operates 33 deep oil wells (4.700 - 5.300 m depth), of which;

- 15 wells are in oil-production;
- 1 well is being used for pressure maintenance;
- 6 wells are in test production for different oil and gas-condensate reservoirs;
- 5 wells are being used for monitoring and exploration testing (including 2 which are being worked over);
- 1 well is ongoing with drilling operations;
- 1 well is awaiting drilling operations; and
- 4 wells are in conservation.

One heavy drilling rig and two work-over rigs, from which one is used to drill water wells at a depth of 1000 m, are currently in operation at the Field.

In addition to exploring the Field, Zhaikmunai are producing marketable quantities of oil and condensate. Gas is being produced in significant volumes and the construction of a GTP is underway. Daily oil production has risen to 1200 m^3/d. Full figures for oil production at the OTU are presented below in Table 1.

From the production wells, sub-surface flow lines carry product to the OTU for primary treatment. Following primary treatment crude oil is then pumped from the OTU to the Oil Terminal near Uralsk via an oil pipeline, which allows oil to be delivered directly to the loading terminal for export by rail.

According to Zhaikmunai management, over the next 30 years the Field will have 38 operating wells.

Zhaikmunai plan to increase the capacity of their operations at the Chinarevskoye Field by extending the OTU, which will involve construction of an additional Demurcaptanization unit and an additional oil storage tank, building a GTP (which is already under construction) with an associated gas pipeline and gas terminal and constructing a water re-injection plant to maintain reservoir pressure. Zhaikmunai already have six wells awaiting exploration of the new sub-terrain oil-gas condensate

layers, however these cannot be exploited until the new infrastructure in the form of OTU expansions and GTP installations have been completed.

Table 1: Oil Production Volumes 2000-2008

Oil production 2000-2008 at the Oil Treatment Plant (tonnes)									
Year	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Month									
January		3,104,293	4,944,808	6,248,607	11,401,506	10,565,766	9,270,442	18,300,245	18,924,500
February		2,570,039	4,330,981	6,964,414	10,171,695	8,132,896	9,586,112	16,046,796	18,770,345
March		3,623,252	4,839,049	8,646,973	9,902,769	8,811,984	8,852,344	18,940,592	21,254,658
April		3,625,988	6,462,373	6,155,498	10,140,594	8,705,651	8,970,762	19,122,871	20,668,761
May		4,234,518	7,818,197	6,379,447	10,080,665	8,697,100	8,490,860	16,687,135	17,910,998
June		4,588,950	7,377,746	6,210,573	9,175,420	9,278,659	9,141,942	17,956,343	16,828,140
July		4,529,052	7,258,253	13,457,801	8,857,101	9,415,237	12,497,526	18,563,848	15,810,906
August		4,504,903	6,738,482	15,132,762	9,298,569	8,194,874	12,067,385	21,171,467	26,312,380
September	3,394,200	4,280,987	6,322,417	13,382,877	8,639,378	8,687,213	13,837,169	20,629,087	26,406,003
October	3,516,600	4,302,271	6,851,306	14,553,507	8,889,044	8,823,199	14,963,889	18,107,676	28,299,629
November	3,310,764	4,447,680	6,436,289	10,748,169	8,256,231	8,931,707	14,751,956	21,389,323	19,054,284
December	3,251,589	4,918,342	5,814,424	11,804,885	10,634,447	9,420,772	16,267,340	22,183,877	11,921,463
Total	**13,473,153**	**48,730,275**	**75,194,325**	**119,685,513**	**115,447,419**	**107,665,058**	**138,697,727**	**229,099,260**	**242,162,067**
TOTAL	**1,090,154,797**								

1.3.1 Oil Treatment Unit (OTU)

The Company operates an OTU at a capacity of 400,000 t/a the plan of which can be seen in Appendix I. Zhaikmunai has state approval for the OTU (document 1.5 t). The total number of buildings at the OTU is 26 and the total area of the OTU is 5,3542 ha (See appendix J for full details on age and size of each building).

The OTU currently receives crude oil from 15 operating production wells on the Chinarevskoye Field. The oil enters the treatment unit through 15 manifold inlets and passes through a 3-stage oil-gas-water separation system. The gas is currently flared by 2 stacks and the oil is processed by the demercaptanization plant before being passed to 2 storage tanks of 2,000 m^3 and 3,000 m^3 capacities. Crude oil is then transferred by export pumps to be transported from site by oil pipeline to the Oil Terminal. The oil pipeline can transport 2 million tonnes per year and the storage tanks are capable of holding 1 week's production before over capacity is reached. Photographs are presented in Appendix E (Photographs 5-7).

1.3.1.1 *Demercaptanization Plant*

As a result of the presence of elevated levels of H_2S in several sub-terrain oil and gas condensate layers, a demercaptanization plant was constructed in the OTU. The demercaptanization plant neutralises H_2S and reduces the level of mercaptans;

- H_2S before treatment - 115 ppm, after treatment - from 0 to 5 ppm.
- General mercaptans before treatment - 26 ppm, after treatment - from 7 to11 ppm.

The demercaptanization plant uses a chemical base product (demulsifier) which is imported and stored at the site. As part of the demercaptanization plant there are three vessels located 1.6 m underground with capacities of 60m³, 40m³ and 16m³ which are used to ensure a stable oil temperature is maintained during the process of demercaptanization.

The demercaptanization plant has its own dedicated oil drainage system, which is required under RoK law. The drainage system comprises of two tanks, one for the export pumps and one for the PIG (cleaning mechanism – Pipeline Inspection Gadget), both of which have a capacity of 16 m³. Any oil collected via this drainage system is pumped back into the system to be re-processed.

After oil has been processed by the demercaptanization plant, heat exchangers are used to decrease the temperature of the oil for storage in the oil tanks.

There are several underground oil drainage tanks (steel) with concrete casing located around the OTU, which are used to receive the PIG after cleaning has been undertaken, or for any maintenance operations (Appendix E, Photograph 22). The volume of oil stored in this tank is monitored by the Operations Room and can be pumped back into the system once a certain level is reached.

1.3.1.2 *Export Pumps*

There are four export pumps located at the OTU. Due to current levels of production, currently only two (Capacity 400kW, throughput - 65 m³/hour and injection pressure 5,4 MPa) of the four export pumps are operating. The export pumps are driven using power from an electrical substation. However, once the two large export pumps, which are currently not in operation, are required (120m³ per hour) they will be driven by gas turbines at the GTP, when it is commissioned.

1.3.1.3 *Gas Flaring*

Before gas can be flared it is processed by 2 gas and liquid separators (one for high pressure gas and one for low pressure gas). The liquid is separated and pumped back into the system and high pressure gas (HPG) and low pressure gas (LPG) are sent via two separate lines to be flared. The gas flares at the oil Field operate 24hrs a day and 100% of gas is flared (Appendix E, Photograph 5). Once the GTP is commissioned HPG and LPG will be sent together to be processed and 98% of associated gas will be utilised.

1.3.1.4 *Operations Room and Laboratory*

The operation room at the OTU runs 24hours a day and is always manned by two members of staff. It provides automatic monitoring for all systems and processes in the OTU including pressure monitors, gas leak detection system, H_2S detection system, fire detection system (which is linked directly to the fire brigade situated on site) and it also has CCTV cameras which cover the OTU. The operation room also monitors the production data for each of the 15 oil producing wells. Each hour all data parameters are recorded for every facility.

There is also a certified laboratory at the OTU which provides analysis for oil and water at the site.

1.3.2 Oil Pipeline

The oil pipeline transports crude oil from the OTU to the Oil Terminal located approximately 20 km North-west from Uralsk. The oil pipeline was commissioned on 5 January 2008 and is still awaiting final regulatory approval and inspection. The oil pipeline has a capacity of 1,200 million tonnes per year. Currently the volume of oil being transported is fairly low, however production will increase once the GTP has been commissioned. The oil pipeline is a closed line and is 12” wide with 8-9mm thickness and 54 bar pressure. The pipeline is 120 km long and lies 1.5 m below the ground surface. The pipeline can be automatically shut down in case of emergency and has oil spill and leak detection equipment which is monitored at the OTU and the Oil Terminal. Each week the PIG is used to clean the pipeline.

The oil pipeline has a cathodic protection system with fibre optic cable connection which is fully automatic. There are 12 stations along the pipeline with block-off valves where pressure and temperature of oil can be monitored (Appendix E, Photograph 11). All of these stations are automatically linked to and monitored by the OTU and the Oil Terminal.

There are the following crossings along the pipeline route:
Underground crossings through rivers:

- Embulatovka River
- Bykovka River
- Rubezhka River
- Krutaya River

Aboveground crossings through rivers:

- Chagan River
- Derkul River

Other underground crossings through:

- Uralsk-Samara railway bed
- Intergas-Central Asia gas pipeline
- Atyray-Samara oil pipeline

The pipeline also passes underneath 3 roads.

1.3.3 Field Personnel Camp

Zhaikmunai operate a Field camp next to the OTU (Appendix E, Photograph 15). This camp is used as a living area for technical staff for all operations at the Field, for storage of equipment and transport, storage of chemicals for all operations and for all logistics relating to technical staff.

Technical staff live and work in the Field on a 7-day or a 14-day rotation, with shifts running from 9am – 9pm and 9pm – 9am. The average number of technical staff at the OTU is 85 and the average number of all personnel staying at the camp is approximately 140 and the average age ranges from 22 to 50 years. Zhaikmunai has a permit for the temporary camp at the OTU (document 1.5 v) which was authorised by the Sanitary and Epidemiological Department of Western Kazakhstan.

1.3.4 Exploration/Production Activities

1.3.4.1 *Exploratory Drilling*

One exploratory well is currently being developed at the Field by SAIPEM using a 5843 drilling rig (well No..52) (Appendix E, Photograph1). Exploration wells are typically drilled to a depth of 5,000 m. Drilling activities are contracted out to two contractors, SAIPEM and UNGG. Whilst SAIPEM are currently the only contractor actually carrying out drilling operations, UNGG are storing drill rigs at the Field for future operations.

AMEC carried out a brief visual inspection of the SAIPEM rig, which appeared to be in good working order and the drill site generally well-managed. Drilling rigs at the Field have State approval for the drilling activities being undertaken. Exploration wells currently have manually operated emergency flares, however future exploration wells will have automatic emergency flares

1.3.4.2 *Production Wells*

The Company currently has 15 wells engaged in active production (No.. 10, 24, 28, 50, 20, 22, 56, 54, 30, 51, 52, 62, 115, 65 and 63). In addition, six wells are in test production (No. 29, 31, 23, 32, 27 and 33). Five wells are undergoing long term monitoring and exploration testing (No. NS1, NS2, NS3, NJ1 and NB1), including two wells which are undergoing work-overs, most of which are anticipated to come on-line in the near future.

Production wells typically consist of a re-instated exploratory well footprint, two manually-operated emergency flare pits, a Christmas tree well head, pigging station and flow line connection (Appendix E, Photograph 4). The production wells are manned on a 24-hour basis from the Operations Room at the OTU and inspected each day by a Field control team. The production wells are surrounded by clay bunding and are situated on a concrete pad.

A network of flow lines are installed at two metre depths, carrying the produced oil and gas mix from producing wells to the OTU. These flow lines are of fibreglass construction and are therefore not exposed to the corrosion/maintenance issues associated with steel/plastic flow lines used previously. Furthermore, each producing well is equipped with a PIG system to facilitate a regular programme of flow line cleaning (Appendix E, Photograph 2). Flow lines are pressure-tested prior to commissioning. All flow lines have emergency shut off valves in case a leak is detected or elevated pressures are experienced (Appendix E, Photograph 2). No power generation is required to operate the majority of the production wells as they are driven by reservoir pressure.

1.3.4.3 *Historical Wells*

The Field includes six abandoned wells (No. 1, 2, 4, 5, 7 and 9) previously drilled for exploration activities during initial Field exploration activities in the mid-1960s. These wells have undergone decommissioning in accordance with regulations for liquidation of wells.

Security, pressure and integrity (leaks/damages) of abandoned wells are inspected annually and the rehabilitation of abandoned wells is undertaken according to a

government programme. Further information on the Company's rehabilitation programme can be seen in Section 5.9.

1.3.4.4 *Conserved Wells*

The Field includes four wells (Well No. 12, 13,61 and 57) which are being conserved which may be used in the future for exploration/production operations or for maintaining the reservoir pressure through water re-injection. The conservation wells are surrounded by secure fencing and clay bunding and are situated on a concrete pad.

1.3.5 Oil Terminal

The Oil Terminal, which is used to export crude oil via railway, is located 20 km north west of Uralsk and the plan can be seen in Appendix H. It was built in 2007 and commissioned on 12 January 2009 and is still awaiting final regulatory inspection and approval. The total number of buildings at the Oil Terminal is 13 and the total area of the Oil Terminal is 10,9053 ha (see appendix J for full details on size and age of each building).

Oil enters the terminal through input flow lines which are connected to the 120 km oil pipeline from the OTU. There are three acceptance lines for oil, of which one remains out of use in case of maintenance or cleaning. All technical oil pipelines have a metering system which measures the temperature, pressure and flow rate of oil and are monitored from the Operations Room (Photographs of the Oil Terminal are presented in Appendix F).

There is an underground steel oil drainage tank with concrete casing and a capacity of 8m^3 (T603) located at the input flow lines, which is used to receive the PIG after cleaning has been undertaken. The volume of oil stored in this tank is monitored by the Operations Room and can be pumped back into the system once a certain level is reached.

Once oil has been received at the Oil Terminal through flow lines, it is sent to one of two oil storage tanks, each with a capacity of 5,000m^3 (Tank numbers T501 and T502). There are a further two underground steel oil drainage tanks with concrete casing each with a capacity of 63m^3 (T601 and T602) located at the Oil Terminal which are used in case of cleaning or maintenance. One tank collects oil from the technical pipes and one collects oil from the loading facility. There is also a metering system which is monitored by the Operations Rooms and once tanks reach a certain volume, contents are pumped back into the bulk oil storage tanks (5,000 m^3).

There are 3 pumps at the Oil Terminal, each with a capacity of 275m³ per hour, which transport the oil from the bulk storage tanks to the loading station. Only two pumps are in operation as one pump is always kept in reserve.

There are no residential facilities at the Oil Terminal. Work shifts at the Oil Terminal are the same as those at the OTU with technical staff working a 14-day rotation with shifts running from 9am – 9pm and 9pm – 9am. The average number of technical staff at the Oil Terminal is 67.

1.3.5.1 *Loading Station*

The railway loading station consists of seven railway lines and one oil loading bay which consist of two sides (A and B) with 15 arms on each side (Appendix F, Photograph 4 and 5). This is a closed system which is linked to a Vapour Recovery Unit (VRU) and is fully automatic and monitored from the Operations Room. Each loading arm has a foam fire fighting pump, gas leak detection and fire detection systems.

1.3.5.2 *Vapour Recovery Unit (VRU)*

All facilities at the Oil Terminal are linked to the VRU which collects 96-98% of all gas and vapours produced. The VRU consists of one nitrogen tank, one air tank and two compressors which manage the process using hydraulic pressure (Appendix F, Photograph 7). All gas vapours from the tanks, the loading area and the technical pipes are transported to a separator where any oil is extracted and recycled into the system. Gas is then filtered through absorbent material, purified from hydrocarbons and then emitted as clean air emissions. The VRU has a capacity of 404 tonnes per year.

The Company is one of the first in Kazakhstan to operate such a system.

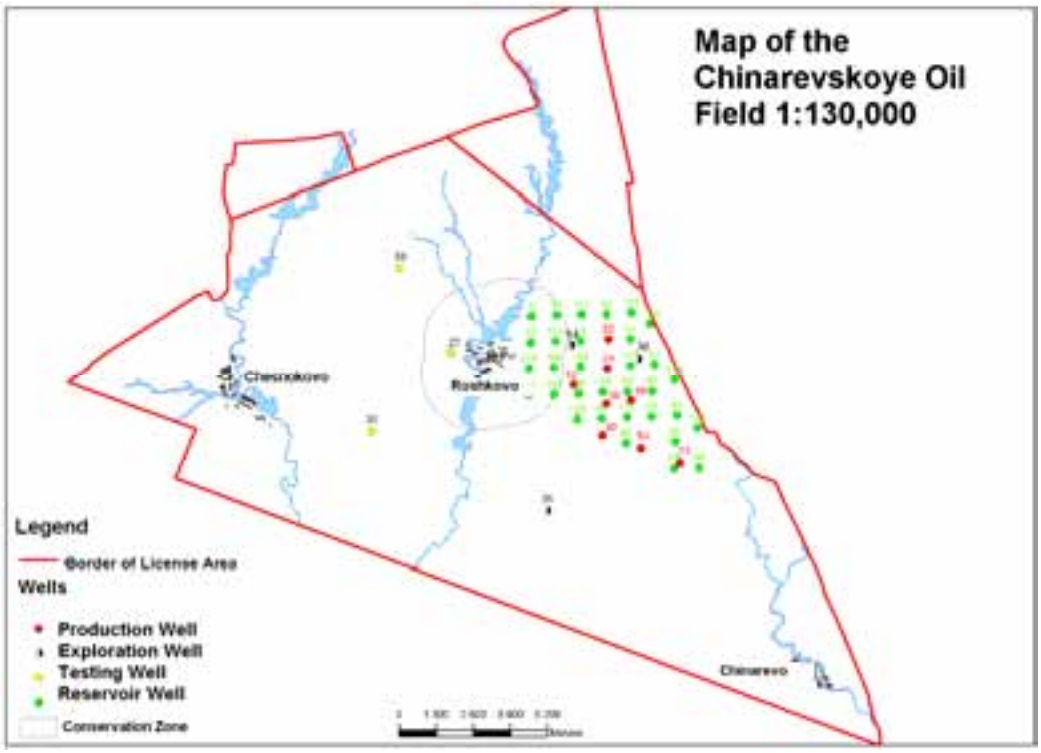
1.3.5.3 *Operations Room and Laboratory*

The Operations Room at the Oil Terminal runs on a 24-hour basis and is always manned by two members of staff. It provides automatic monitoring for all tanks, systems and processes in the Oil Terminal, including pressure monitors, gas leak detection systems and fire detection system which is linked directly to the fire brigade situated on site. The Operations Room also has an automatic alarm system in the case of an emergency

The laboratory at the Oil Terminal is current being established and has not undergone testing/certification. The laboratory has two underground wastewater storage tanks, of which one is for oily water and the other for domestic wastewater. This water is also sent to a wastewater treatment plant (WWTP), which is located inside the perimeter of the Oil Terminal next to the oil loading station (Appendix F, Photograph 14).

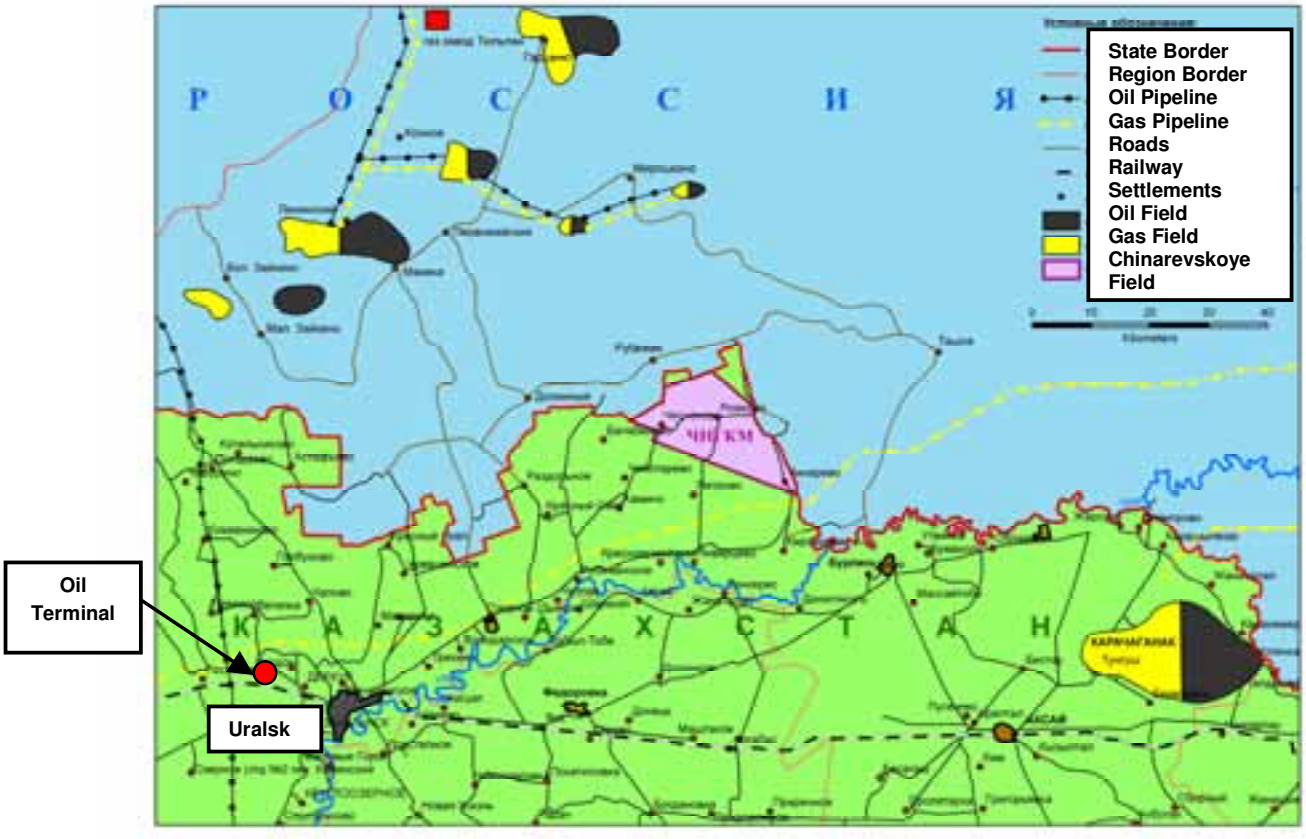
A plan of the Chinarevskoye Field is presented in Figure 2 below.

Figure 2 Plan of the Chinarevskoye Oil Field



A location map of the Chinarevskoye Field and the Oil Terminal is presented in Figure 3 below.

Figure 3. Location Map of the Chinarevskoye Field and Oil Terminal



1.4 Planned Expansion/Construction

Zhaikmunai is planning several additional infrastructure projects in the next few years to extend the production capacity of the Field and to ensure regulatory compliance, with the RoK programme for reduction in flaring of associated gas.

1.4.1 Gas Treatment Plant (GTP)

A GTP is currently under construction adjacent the OTU by KazStroy Service (KSS) and will be commissioned in November 2009 (The plan can be seen in Appendix G).

The GTP will be constructed on virgin land with no former industrial uses or contamination. The GTP will be located approximately 100m away by road from the OTU and will cover an area of approximately 10ha. Currently the site houses equipment ready for the construction of the GTP.

Through a series of processes it will utilise 98% of the associated gas produced at the OTU. It will also allow production to commence in the oil and gas condensate layers and will therefore increase the production at the Chinarevskoye Field. An emergency flare will be constructed as part of the GTP but only a small volume of gas which cannot be treated will be flared.

A contract was agreed on 10 August 2007 with a contractor consortium consisting of Kaz Stroy Service (KSS) (a local contractor) and Hanover (an international contractor) for a USD $182 (w/o VAT) million turnkey implementation and construction project to entail two gas treatment unit trains with a capacity of 750mill m^3 per year;

Train 1 – Associated gas utilisation in association with gas turbine for power generations and export to local markets (methane and ethane); and
Train 2 – Complex gas treatment producing marketable products, including Butane, Propane, stabilised gas condensate and pelletised sulphur.

This contract encompasses the following elements of the Gas Utilisation Programme:

- Engineering design;
- Project approval;
- Fabrication and delivery;
- Civil works and commissioning;
- Training; and
- Bringing units to design parameters.

The Gas Utilisation Programme comprises the following basic elements with specific performance guarantees provided by project contract, including 10% of project value for significant delay or non attainment of identified project design parameters.

Table 2: Gas utilisation Programme

Action/Item	Completion Date
Programme Feasibility Study	Completed April 2006
Submission for Approval	Completed August 2006
Construction of 2 treatment units	EPC contracts began 2007
Delivery of units	EPC contracts began 2007
Commencement of construction	Began 2007
Gas Export Pipeline commencement	Began 2007
Commissioning Train 1 and Power Generation	September 2008
Commissioning Train 2	2009

This programme was subject to several delays and a supplementary agreement between Zhaikmunai and KSS was agreed on 23 April 2008. At present 100% of the earthworks have been completed and 12 LPG tanks are on site and equipment provided by Exxon and Nippon Neftegas from Dubai is present on site. Zhaikmunai are responsible for inlet system from the OTU which will be connected once the GTP is commissioned.

Zhaikmunai also plan to build a 3rd train with a capacity of 1.5 million m^3 per year once the GTP has been commissioned.

All stages of the existing OTU are ready for the commissioning of the GTP. Gas from the OTU is separated in the final stages of the process and 100% of the associated gas will be sent to a vapour compressor and then to the GTP to be utilised.

As part of the GTP, Zhaikmunai plan to construct a Waste Water Treatment Plant (WWTP) to ensure that the quality of process wastewater is suitable for re-injection into the reservoir. The basic design of the WWTP has been provided by PM Lucas Engineering and the equipment will be provided by Zhaikmunai. However at present they have only completed FEED and have not prepared any technical documents. Zhaikmunai reported that the WWTP will be constructed by the end of 2009.

1.4.2 Gas Pipeline

In association with the GTP, a 15 km glass fibre gas pipeline (the pipeline) is currently being constructed by Zhaikkyrylys, a local construction company, which is planned for completion in September 2009. This will transport gas from the GTP to the Intergas Central Asia gas pipeline (part of KazTranzGaZ).

This trunk gas pipeline will export associated gas (methane and ethane) to be sent to the main gas network to be sold in the local market. Gas quality data will be analysed before it is transported to the Intergas pipeline and Intergas will also analyse the quality of the gas received from the trunk pipeline. If the quality of gas does not meet the required standards a shut-off valve will be operated and the gas will be flared by Zhaikmunai using an emergency flare.

At present the pipeline routing survey has been completed, and 50 cm of topsoil has been removed along the length of the pipeline.

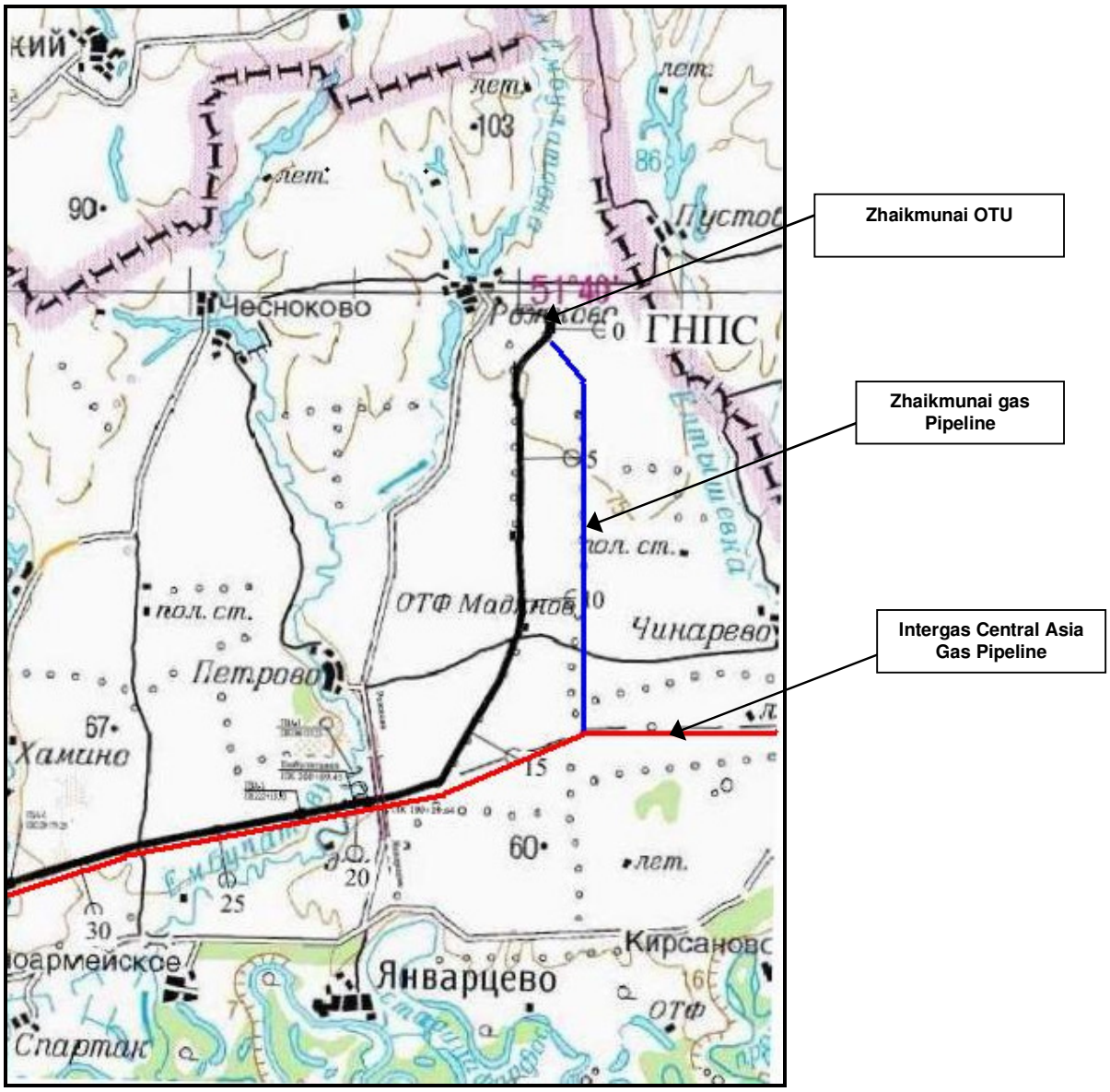
The pipeline will be constructed across predominantly agricultural land and will use the "spread method" of pipeline construction. This is a cost-effective technique and is the main method of pipeline construction for general ground conditions where long sections of unsupported trenches can be maintained open. The pipeline will be buried at 0.8 m below ground for the whole length of the course.

1.4.2.1 *Routing, Crossings and Surroundings*

The pipeline will begin at a tie-in with the GTP and will travel generally in a southern direction towards the Intergas Pipeline. The pipeline does not cross any roads, rivers, surface water features or railways and there are no villages located along the pipeline route. The closest population areas are Chinarevo village, located 6.8 km away and Petrovo village, located 8.3 km away.

Figure 4 below outlines the location of the pipeline in context with the local environment.

Figure 4: Gas Pipeline Location



The proposed pipeline route is rural in character and well removed from any population centres.

1.4.2.2 *Pipeline Design*

The pipeline has been designed in accordance with Kazakhstan legislation for Trunk Pipelines, including:

- Guidelines on Safe Operation of Trunk Pipelines KZ RD 39-002-98; and

- Trunk Pipeline Protection Rules KZ RD PL.

Design parameters for the pipeline are set out below in Table 3.

Table 3 Pipeline Design Parameters

Design Feature	Parameter
Diameter	600mm
Pipeline wall thickness (standard)	12mm
Depth of cover (to top of pipe)	0.8 m minimum
Operating pressure	6.0 MPa
Throughput	2.5 bcm/y

The Gas Pipeline buffer zone is 50 m wide and the total agricultural land take for construction will be 75 ha. The Trunk Pipeline Protection Rules KZ RD PL prohibit performing any jobs in the protection zone of gas pipeline without prior notice and approval of gas pipeline owner.

Comprehensive operating procedures will be developed to ensure the following:

- Administrative system covering legal considerations, work control and safety;
- Clear and effective emergency procedures and operating instructions;
- Adequate and regular training of all personnel involved in operational and maintenance matters;
- Comprehensive system for monitoring, recording and continually updating the state of the pipeline and auxiliary equipment;
- Permit to work system to control all work adjacent to the pipeline or work which might interfere with gas flow;
- Schedule for the regular inspection and maintenance of pressure regulating equipment, pipe work and ancillary devices to promote a high level of reliability and safety in operation;
- Effective corrosion control and condition monitoring;
- System to collect and collate information on third party activities to reduce the risk of pipeline damage;
- Regular contact with landowners/occupiers of the land through which the pipeline passes;
- Monitoring of land restoration and crop losses, and the undertaking of remedial land drainage works where necessary; and
- Emergency procedures – Intergas will have in place a Major Accident Prevention Document (MAPD) in accordance with Pipeline Safety Regulations.

1.4.3 LPG Terminal

A LPG terminal is also planned for construction after 2010. LPG will be transported from the GTP via road using specialist transport to the LPG terminal. The LPG terminal will be situated directly adjacent to the existing Oil Terminal and will be approximately the same size as the Oil Terminal (10ha). It will be constructed on virgin land with no know former uses. Currently the site mainly comprises of bare earth with a sparse layer of vegetation and residual equipment from the construction of the Oil Terminal.

The LPG terminal will have an acceptance area for vehicles transporting LPG from the GTP at the Chinarevskoye Field and 18 tanks for LPG each with a capacity of 600 m^3. It will have technical gas pipelines to transport LPG to the loading facility for export by rail, which will be at the same site as the current oil loading facility. The LPG terminal is planned to be constructed with similar systems as the Oil Terminal; it will be a closed system with a VRU, fire fighting systems and gas detection systems. At present it is unknown who will construct the LPG terminal.

As part of the natural resource use permit granted by MEP (document 1.2 C), after commissioning of GTP Zhaikmunai must supply LPG to the local Western Kazakhstan Market in the amount of 50,000 tonnes per year and Zhaikmunai will also need to provide quarterly reports to MEP on volumes of gas produced and whom it has been brought by.

1.4.4 Extension to the Oil Treatment Unit (OTU) and Oil Terminal

Zhaikmunai plan to double the capacity of the OTU by constructing an additional Demurcaptanization plant with associated infrastructure and an additional oil storage tank with a capacity of 5,000m^3 (same capacity as two existing bulk oil storage tanks combined).. These facilities will increase capacity of the OTU by 400,000 tonnes per year which will bring the capacity of the OTU to 800,000 tonnes per year. The extension to the OTU will be built within the perimeter of the existing OTU and will include the same processes and many of the same facilities that are currently in operation at the OTU, however Zhaikmunai report that they will use updated processes and technologies wherever possible.

The construction of this extension is planned for 2011. At present the site where the planned OTU extension will be built is vacant apart from decommissioned oil loading facilities which were used before the oil pipeline was constructed to transport oil via

road to the rail connection near Uralsk. These will be scrapped to create space for the planned infrastructure and the waste metal will be disposed of and re-used by a licensed contractor.

Zhaikmunai also plan to construct an additional two oil Storage Tanks at the Oil Terminal each with a capacity of 5,000 m^3 to accommodate the extra production capacity of the Field. Concrete base plates are already present adjacent to existing oil tanks at the Oil Terminal.

1.4.5 Reservoir Pressure Maintenance system

In several of the sub-terrain oil and gas condensate layers, the levels of pressure are decreasing which is not condusive to maintaining efficient production. To ensure continued production at the Field, the Company are constructing a water re-injection plant to maintain reservoir pressure and enhance production yields.

The reservoir maintenance pressure system is being constructed 2 km south of the OTU. Construction of this plant is being undertaken by Promhymmontazh, equipment is being provided by Uraltechnostroy and further construction and pipeline equipment is being provided by Zhaikkurlyls.

The current facilities on site consist of four water storage tanks (each with 50 m^3 capacity), drainage tanks and a Chemical Feed Unit. Additional facilities are planned for construction in 2009 including; two storage tanks (each with 1000 m^3 capacity), a pipeline from the OTU to the Water Treatment Site, a Separator, a Booster Pump House, an Inlet Manifold system, a Chemical Feed Unit, Filters, a High Pressure Group Pumping Station, a Water Distributing Point and HP Flow lines to injection wells.

The volumes of water used for this re-injection plant will have to match the volumes of oil produced, which will mean that the volume of water used on site will be significantly higher than at present.

Before water is re-injected into the layers it will be stored in the reservoir tank at the OTU and will be treated in a WWTP that will be constructed along with the GTP. Once the water has been filtered and analysed to ensure it meets the requirements for re-injection it will be sent to the reservoir maintenance pressure system and will be re-injected.

Another reservoir maintenance pressure system is planned for construction in 2011 at the North side of the OTU. This will consist of a further 5 re-injection wells.

However at present there are no construction plans or CAPEX allocated for this project.

2 SCOPE OF WORKS

The EHS evaluation comprised of:

- EHS compliance audit of existing facilities to assess performance against applicable local and international regulations and identify existing EH&S risks and liabilities; and
- EHS analysis of the proposed expansion, in order to identify potential impacts and mitigation measures, and where risks are identified address these through an Action Plan.

The primary objective of the evaluation was to assess compliance of existing and proposed facilities/operations with the Performance Requirements contained in the European Bank of Reconstruction and Development (EBRD) Environmental and Social Policy 2008 (the Policy).

AMEC considered both European Union (EU) and RoK legislative requirements when carrying out the audit and analysis. Where RoK regulations differed from levels and measures required by EU standards, AMEC applied the more stringent requirement. Where EU EHS requirements for a particular aspect did not exist, AMEC considered other international standards and best practice, such as World Bank Group guidance.

2.1 Approach

AMEC approached this assignment following the approach which is documented in ISO 14015:2001 “Environmental Assessment of Sites and Organisations” (EASO). This International Standard gives guidance on how to conduct an EASO. It provides the basis for harmonization of the terminology used and for a structured, consistent, transparent and objective approach to conducting such assessments. It can be used to assess any organization regardless of geography.

2.1.1 Data and Legislative Review

The evaluation was based predominantly on the review of documentation provided by Zhaikmunai in hardcopy and electronic formats. AMEC reviewed available data with the focus of obtaining pertinent information for the assessment of compliance and identification of potential environmental and social impacts. An index of documents reviewed during by AMEC can be seen in Appendix D and reference is made throughout the report to these documents.

2.1.2 Site Visits and Meetings

AMEC visited Zhaikmunai's headquarters on 6 April 2009 and carried out asset inspections on 7 - 11 April 2009. The objective of site visits were three-fold:

- To verify information collected through the desk-based document review process;
- To add additional practical detail to information obtained through the document review process; and
- To ascertain the condition of the physical and human environment surrounding the assets.

No sampling, physical analysis and/or testing of any media were carried out as part of the evaluation. The impacts in the evaluation were addressed through obligations detailed in an Action Plan.

In order to assess the views and opinions of local regulators towards Zhaikmunai's current and proposed operations, AMEC attended a meeting on 10 April 2009 with Mr Sholpan Suleimenova, Head of Ministry of Environmental Protection (MEP) for Western Kazakhstan, based in Uralsk.

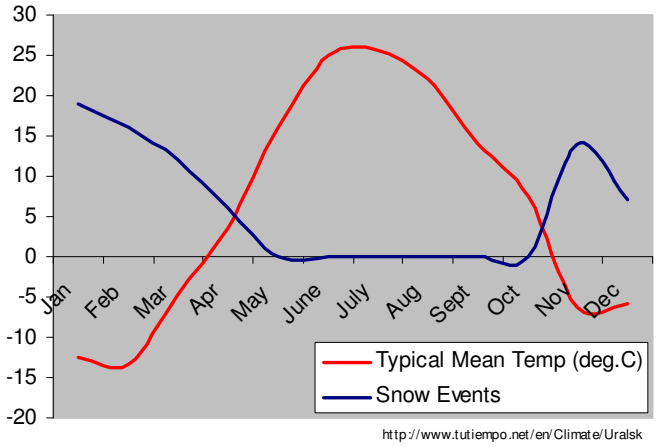
An In-Country log of activities and personnel can be seen in Appendix B.

3 BASELINE CONDITIONS

3.1 Climatic Conditions

The local climate is continental and is influenced by the Central Asian steppes. A cold and dry winter is succeeded by a hot and still drier summer. Rainfall is negligible, however, there is significant snowfall mainly in the winter months of November-April (See Figure 5 below). Meteorological monitoring at Zhaikmunai's facilities is performed by the West-Kazakhstan Center of hydrometeorology.

Figure 5: Local Climate



3.2 Land Use, Culture and Biodiversity

The municipal capital of the Western Kazakhstan oblast is Uralsk, which is located approximately 80 km away from the OTU and 20 km away from the Oil Terminal. It has a population of 210,600 and its ethnic composition is dominated by Kazakhs (72%).

The Field is situated within the territory of the Zelenovskiy district. The district is situated in the northern part of the oblast and was founded in 1939. The area of the Zelenovskiy district is 7,4000 km², the population is 53,800 and the average population density is 7,2 (per km²). The district centre is the village of Peremetnoye, founded in 1898 which is located 38 km from the city of Uralsk. Zelenovskiy district is classified as I Agricultural Zone – steppe, grain husbandry and animal raising (in the northern part of the oblast). In this zone farmers grow grain crops, oil-yielding plants, fodder plants, potatoes and vegetables, fruit and berries trees. Animal husbandry is

well developed and includes cattle, poultry and sheep management. There are no industrial facilities located within a 2 km radius of the Company's facilities and the land is mainly used for agriculture and residential purposes.

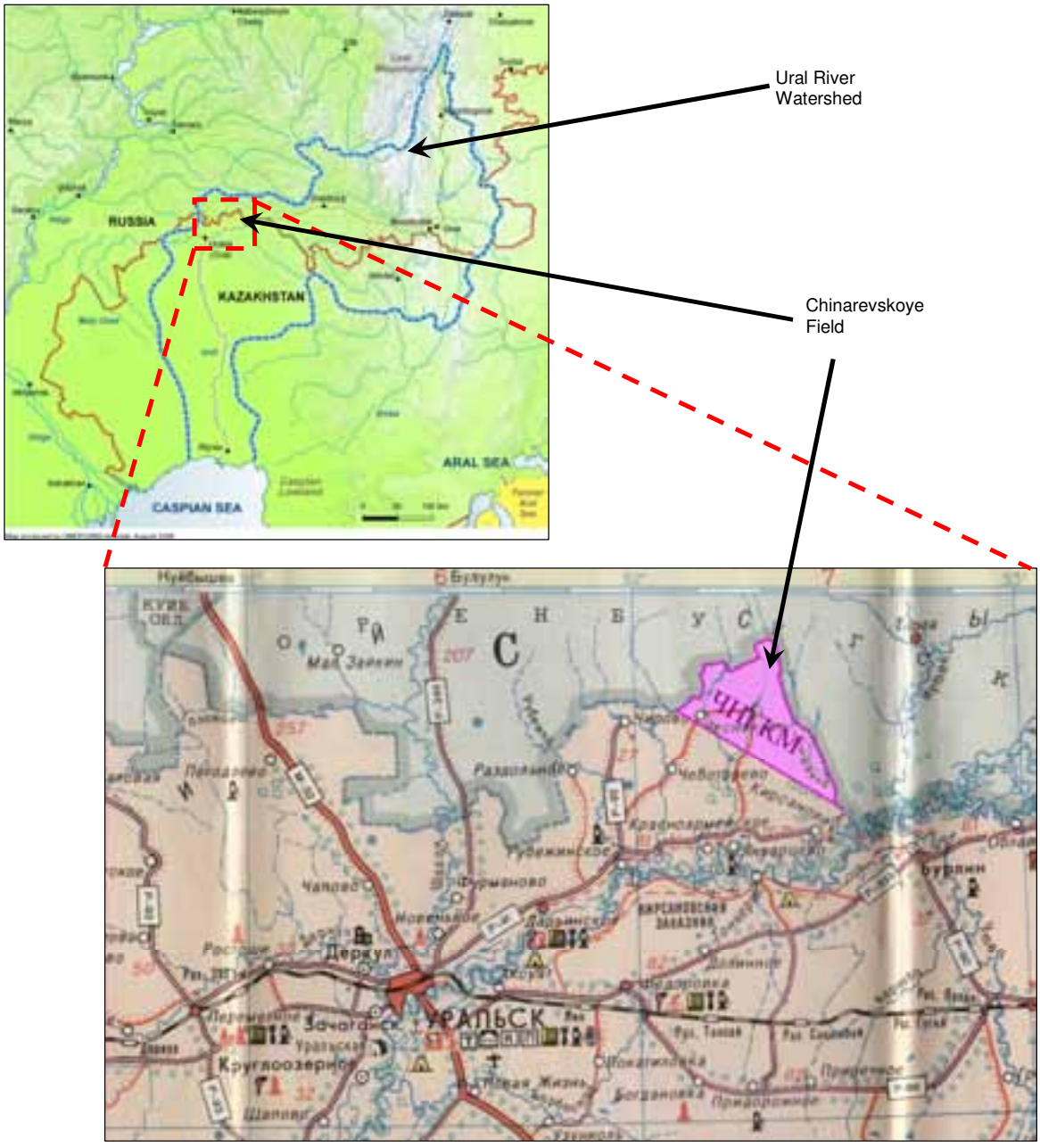
The closest village to the OTU is Rozhkovo village (Appendix E, Photograph 13). Rozhkovo village is located 2.5 km away and has a population of approximately. 300 people (84 families). There is a primary school in Rozhkovo and children continue their education in Yanvartsevo village, which is located 30 km from Rozhkovo. There are several other villages located close to the OTU;

- Chesnokovo – 11 km;
- Petrovo – 14.3 km; and
- Chinarevo – 12.3 km.

The closest village to the Oil Terminal is the village of Beles which is located 2 km away. See Figure 6 below for a map of the district.

As illustrated in Figure 6 below, local relief of the territory is dominated by relatively flat plains, crossed by rivers and gullies with uplands in the south and hilly plains in the north, with elevation up to 100 m (see Appendix E, Photograph 12 and Appendix F, Photograph 3). The Ural River passes immediately adjacent to the South-eastern edge of the Field, however the closest Zhaikmunai oil Field operations/facilities are approximately 15 km north of the River.

Figure 6: Ural River and Zelenovskiy District



The national population of Kazakhstan is estimated at 15.48 million (World Development Indicators database, September 2008). Population growth rate is 1.1.% (World Development Indicators database, September 2008) and life expectancy at birth is 66 years (World Development Indicators database, September 2008). National mortality rates (under 5 years) are 25.7 per 1,000 (CIA World Factbook 2009 estimates). The main contributors to Gross Domestic Product (GDP) in 2007

were services (49%), industry (44%) and agriculture 7% (World Development Indicators database, September 2008).

There has not been a survey of the Field to identify if any archaeological artefacts or cultural heritage resources are present. At present there are no known cultural heritage issues around Zhaikmunai facilities.

There are no National conservation areas, natural parks or reserves within 5 km from the Chinarevskoye Field or the Oil Terminal (www.western.kz official document ZKO_2008).

3.3 Geology and Hydrology

3.3.1 Geology

Across the Zelenovskiy district clayey and loamy soils prevail, with some areas of sands and salt-marshes and some chernozem areas in the north. Site management reported that in the areas around the Chinarevskoye Field the soil type is mainly clay which is often found in depths up to 20 m.

The Chinarevskoye Field is located in the Western Kazakhstan Oblast (WKO) which is situated within the northern part of the deepest Caspian tectonic vug (basin), which is on the South-eastern edge of the Eastern European platform. The basement on the Chinarev elevation consists of coarsely-graded crouan, which is considered of early Proterozoic Age. According to existing data, in the early Devonian Phase of tectonic activity the basement was broken through by the dikes of the bedding rocks. The surface of the basement is referred to as the reflecting horizon “F” and the drilling category of rocks is IX – X.

3.3.1.1 *Geotechnical Investigations*

Geotechnical Investigations are undertaken for all oil and gas condensate wells at the Chinarevskoye Field. These investigations are carried out in order to study the following;

- Lithologic and stratigraphic profile, its stratification and correlation;
- Reservoir beds and assess fluid content;
- Physical properties of reservoir rocks;
- Choose targets for testing; and
- Borehole condition and cementing quality.

Geotechnical investigations are performed by KazPromGeophysica – a local company to a depth of 0-2700m and geotechnical investigations to a depth of 2700-5100m are performed by Baker Hughes and Shlumberger. Further details of geotechnical investigations can be found in Appendix M.

3.3.1.2 *Soil Quality Monitoring*

Soil quality monitoring has been undertaken on an annual basis at the Chinarevskoye Field by Third party contractors since 2002, the results of which are reviewed and approved by MEP in line with the requirements of operating permits. Samples are taken at five discreet locations; one central to the Field and at four points on the boundary of the sanitary protection zone. From 2001-2007 the samples have not exceeded the permitted levels of operational control and no elevated levels of contaminants have been found. AMEC reviewed the Annual Report of Environmental Monitoring 2008 (Document 1.6 d). The Laboratory of the Sanitary and Epidemiological Expertise of Western Kazakhstan undertook analysis of all samples which included testing for zinc, cadmium, copper and oil products. This report was approved by MEP and stated that Zhaikmunai did not exceed any set norms for environmental contamination and no elevated levels of contamination were found to be present.

3.3.2 Hydrogeology

The Chinarevskoye oil and gas condensate Field is located in the northern region of the North Caspian artesian basin, where two hydro-geological floors are situated: Late Permian Mezo-Cenosoic past salt and Palaeozoic subsalt, which are divided into regions by the salt-bearing Section (more than 1000 m) of Cungiurian Age. The abundance of water in the water carrying layers is very low; usually water is located in the weak sand layers, embedded in clay. The water is strongly mineralized, has a sour salty taste and cannot be used for drinking. Domestic water supply for the settlements in this area is abstracted from the groundwaters of the Upper Cretaceous, the Paleogenous and the Neogenous-Quarternary deposits at a depth of 120 m. The testing results showed that the deposits richest water in are situated at a depth of 60 to 120 m, within the water horizons in the rivers' valleys and balks. The most suitable for domestic use are the waters of the alluvial water deposit of the Ural River.

3.3.2.1 *Details of the Water Bearing Reservoir*

The main horizon used for technical water supply in the Chinarovskoye Field is the water-bearing Upper Pliocene (N2 a). The Akchagyl deposits are widely spread on the site and they underlie younger formations. The groundwater is confined to fine-grained and semigravel, up to 10-20 m or more thick. Through hydro geological Sections there is a consistency of water holding Akchagyl deposits in thickness and area and groundwater typically occurs at 19-75 m. The waters are of low pressure and the delivery lift is 11-27 m depending on the terrain. The piezometric level is established at 7-15 m (river valleys, lower terrain parts) to 22-28 m.

Production rates of water wells reach 1.7- 4,0 dm^3/s at reduced water levels for 14,3-25,0 m. Specific discharges total 0,1-0,16 dm^3/s. Filtration ratio (flow rate) is from 30 to 160 m/d and on average is 66 m/d. The water abstracted is slightly brackish. The feeding of the water-bearing horizon takes place at outcrops of Akchagyl deposits to the north from the site. There is also a flow-over from upper aquifer of sub-sdzyrt sands. The general slope of underground waters is directed to the South-west.

3.3.2.2 *Groundwater Use*

Groundwater use in a 5 km radius from the Chinarevskoye Field and the Oil Terminal is currently used for technical water supply of the Zhaikmunai facilities from a number of groundwater abstraction wells. There are no other industrial facilities within 5 km and there is no information about other remotely located wells belonging to other companies. The north and east of the Field is bounded by Russian territory.

Though of variable depth of occurrence, it is understood that groundwater typically occurs below 20 m across the operational areas of the Field. It is understood that water utilised by regional towns and villages exists at shallower horizons. Furthermore, occurrence of groundwater below 20 m is below the threshold at which more stringent groundwater monitoring is typically enforced.

3.3.2.3 *Groundwater Monitoring*

An MEP approved groundwater monitoring plan has been developed by Zhaikmunai and this was made available to AMEC for review (document 1.3 z). Currently however, existing water abstraction wells are typically used for sampling both for chemical analysis, on a quarterly basis, and groundwater level, on a monthly basis. Results for groundwater monitoring for Q.1 of 2009 and the anionic-cationic content of groundwater from wells for injection of brine and wastewater since the beginning of exploration works can be seen in Appendix N.

3.3.2.4 *Surface Water*

The major natural water resource in the Zelenovskiy district is the Ural river (284 km) which is the main water artery of the region and covers a basin of 231,000 km². It crosses several geographical zones and runs from north to south ending at the Caspian Sea. The tributaries of the Ural River are the Chagan (116 km), Derkul (127 km), Kushum (48 km), Embulatovka (99 km), Rubezhka (82 km), Bykovka (90 km) and the Ural-Kushum irrigation system with Kirov storage pond and 99 ponds, which is located mainly in the northern part of the district.

The Embulatovka River runs through the Sanitary Protection Zone (SPZ) zone at the Chinarevskoye Field and at its closest point is approximately 2 km away from the OTU (Appendix E, Photograph 14). Unlike other rivers of the region which have 5-7 % of low flow, Embulatovka has 22 % of low flow. At 5 km distance westward off OTU is the river Yeltyshevka, which runs through Russian territory.

There are no water protection zones within 5 km of Zhaikmunai's facilities. However 10.5 km to the South-west of Zhaikmunai facilities is a central area of the Yanvartsev irrigation Field.

3.3.2.5 *Surface Water Monitoring*

Water quality monitoring has been undertaken on a quarterly basis at the Embulatovka River by Third party contractors since 2002, the results of which are reviewed and approved by MEP in line with the requirements of operating permits. From 2001-2007 the samples have not exceeded the permitted levels of operational control. AMEC reviewed the Annual Report of Environmental Monitoring 2008 (Document 1.6 d). The Laboratory of the Sanitary and Epidemiological Expertise of Western Kazakhstan undertook analysis of water samples which included testing for suspended solids, oxygen, dry sediment, chlorides, sulphur, ammonia, nitrates, oil products, copper, zinc and cadmium. This report was approved by MEP and stated that there were slightly elevated levels of suspended solids but Zhaikmunai did not exceed any set norms for environmental contamination.

Zhaikmunai's facilities are situated in a flood plain and site management report that occasional flooding does occur especially during spring and autumn along some of the access roads. Some historical drill site flooding was also reported to pose an operational issue. As part of the overall recultivation strategy for the well sites, 50 cm of top soil are removed from the drilling pad. The resultant drop in ground level can lead to flooding issues at the drill sites. Whilst the removal of top soil is a prudent and preferable approach, allowing effective recultivation, it is noted that site flooding may increase the likelihood of migration of contaminants in the case of a release.

3.3.2.6 *Drainage Systems*

There are several storm and rain water drains at the OTU and Oil Terminal. All equipment at both facilities has a sloping concrete base with concrete bunding (Appendix E, Photograph 16), which collects rain and storm water into concrete evaporation pits with a capacity of 2m³ (Appendix E, Photograph 17). There are also several open evaporation concrete chambers around the site which collect general storm and rain water run-off from all facilities (Appendix F, Photograph 10). These drains are all separated from each other and the water is left to evaporate within the isolated concrete chambers. If the volume in these drains reach a certain level, the water is pumped out and then transported to a large rain and storm water drainage tank (capacity 50m³) which is transported off site and disposed of by Third party contractors along with domestic wastewater (see Section 5.4.3 for further details).

Fire water at the OTU and Oil Terminal is abstracted from water wells on site and stored in two tanks with a capacity of 1,000m³. (Appendix E, Photograph 32) If fire water is used it is collected in the on site drainage systems for storm and rainwater and either left to evaporate or is pumped into the septic tank along with rain and storm water to be collected by a wastewater disposal contractor

There are no known discharges to surface water from Zhaikmunai's operations and no surface waters or storm sewers within 150 m of Zhaikmunai's facilities which may receive run-off.

3.4 Landscape

The landscape of the Chinarevskoye Field is mainly flat agricultural land. The existing facilities are connected to the National Grid via numerous overhead power lines which cut across neighbouring open agricultural land with few features or mature vegetation.

Figure 7. Photographs of the landscape at the Chinarevskoye Field

The landscape surrounding the Oil Terminal is comparative to that of the Chinarevskoye Field with even less features and mature vegetation, but with comparatively fewer overhead power lines from the National Grid.

Figure 8. Photograph of the landscape at the Oil Terminal

Using the criteria outlined in Table 4 below, the landscape of the Chinarevskoye Field and the Oil Terminal were both classified as Ordinary-Poor with the following characteristics:

- Open agricultural land;
- Presence of local settlements;
- Presence of significant number of OHL; and
- Lack of natural features and mature vegetation.

Table 4: Landscape Baseline Classification Criteria

Classification	Characteristics
Highest Quality	Includes the most aesthetically attractive landscape. Areas of particular Natural Beauty perceived as special in a regional or national context. Nationally designated land such as National Parks, etc.
Very Attractive	Areas include historic and designated landscape. Diverse, semi-natural or farmed landscape with natural features. Normally abundant woodland cover together with a high distribution of trees, hedgerows and shrubs, streams, brooks and other naturalized unpolluted water corridors may be present. Several local landscape designations may apply, including Conservation Areas, and some historical or cultural sites may be present.
Good Quality	Countryside with some variety in farmland cover. Settlements and villages with pockets of open space and public recreation areas. There is a reasonable distribution of semi-natural vegetation, trees and shrub cover and the overall view of the area is pleasant. Local landscape designations of cultural and historic value may be present.
Ordinary Quality	Typical open agricultural land where attractive features are offset by detractors. Some strategic planning is evident but development is primarily functional including local villages, industrial parks or urban fringe land uses. Not particularly aesthetically attractive, but with more value than a poor quality landscape. Land may have a local land-use designation.
Poor Quality	Includes detractors such as powerlines, industrial derelict or inappropriate built forms with no aesthetic value or evidence of strategic planning. There is lack of mature vegetation cover and no landscape designations apply. Intensively farmed landscape, which has lost most of its features.

3.5 Noise

Noise assessments to monitor broadband and continuous noise are undertaken on an annual basis at Zhaikmunai facilities by a Third party contractor. Measurements are taken around the OTU, along the SPZ of the Chinarevskoye Field and at Rozhkovo Village.

Since 2002 noise levels at the Chinarevskoye Field have not exceeded the maximum permissible levels that comply with the requirements of Sanitary Code of the RoK (No.1.02.007-94 Sanitary Standards for Permissible Noise Levels at Workplaces).

The Chinarevskoye Field is not usually affected by excess noise due to its relatively uninhabited and non-industrial nature.

4 CORPORATE MANAGEMENT (EHS)

4.1 EHS Policies and Practices

The Company has a number of written Environmental, Health and Safety (EHS) policies including a Health and Safety (H&S) plan, an Environmental Plan and Action Plans for both H&S and Environment.

The Company H&S plan has been written by the Olymp Group and approved by the MERD (document HS8). It details all aspects of EHS management at Zhaikmunai facilities, including EHS management and roles and responsibilities, EHS inductions, first aid and medical services, EHS training, EHS inspections, Responsibilities in case of violations and Safe working conditions.

Zhaikmunai also have an H&S Action Plan for each year, which is developed by top Zhaikmunai management and approved by MERD. The Action Plan for 2009 (document HS14) details improvements to health and safety operations at Zhaikmunai, many of which have already been completed, or are underway. These include:

- Internal training and safety upgrade for personnel;
- Annual advanced training for EHS staff;
- EHS seminars for all personnel;
- Internal training on safety;
- QEHS External safety knowledge assessment exams;
- Purchase of up to date equipment to improve quality of EHS training;
- Organisation of EHS office at Oil Terminal including provision of rules, norms, and instructions for all departments;
- EHS drills with fire crews and personnel at OTP and Oil Terminal;
- EHS films on drills;
- EHS Meetings and seminars with subcontractors; and
- Regular EHS inspections.

Zhaikmunai's Environmental Procedure is encompassed in 'The Procedure of Supervision at Hazardous Industrial Facilities of Zhaikmunai LLP' which was developed in 2008 (document 1.5 jj). This procedure includes details of interrelated HSE, socioeconomic and organizational measures aimed at establishing safe and healthy working conditions and establishes standard requirements to work management in the sphere of HSE. This procedure was developed based on existing legislative acts, interdisciplinary and industry standards in the sphere of HSE.

Zhaikmunai have an Environmental Action Plan (document 1.5e) which is valid until 2010 and has been improved by the Department of Regulation and Permits of Western Kazakhstan. This Action Plan identifies all environmental actions and improvements to be undertaken in the next two years, many of which have already been completed or are underway. These include:

- VRU at Oil Terminal;
- Soil recultivation of land after construction of pipelines;
- Liquidation of drilling pits;
- Recultivation of land after drilling;
- Flora/fauna – planting of trees around camp;
- Environmental training – upgrade environmental specialist; and
- Environmental seminars for personnel.

An Environmental Audit of Zhaikmunai Facilities to inspect environmental compliance was undertaken by MEP in March 2009 (document 1.5h). This included an inspection of all work activities and stated that only two violations were found:

- Mixing hazardous waste with domestic waste; and
- Burning domestic waste.

This is discussed further in section 5.7.3. Waste Disposal.

4.1.1 Contractors EHS performance

Contractor's performance whilst working for Zhaikmunai with regards to EHS is monitored by various operational (risk assessment, training, maintenance, house-keeping, etc) and reporting (accidents/incidents, etc) obligations outlined in contractual documentation. Whilst EHS performance of Contractors is monitored by Zhaikmunai through the contractual obligations it enforces when procuring goods and services, Zhaikmunai does not monitor personnel recruitment methods/procedures carried out by its Contractors when securing manpower.

Zhaikmunai have a written Purchasing Policy for tenders from Contractors (Document 2.3 a) which establishes the roles and responsibilities for tenders, requirements for all tender processes and a purchasing procedure. In addition to this, the Company have developed a document "EHS Requirements for Contractors" in which it is outlined that contractors form an integral part of Zhaikmunai's operations and subsequently their EHS performance must adhere to Zhaikmunai policies (Document 2.3 b). This document is sent out with all tenders and includes a pre-qualification questionnaire which is required to be completed by all Contractors before any agreement or contract is awarded. Every Contractor engaged by Zhaikmunai is required to produce sufficient EHS Plans and Procedures to cover their scope of work in accordance with Company requirements. These are then approved by Zhaikmunai. The pre-qualification questionnaire requests information from the contractors for the following;

- Personnel qualifications;
- PPE for personnel provided by contractor;
- Environmental protection including fees;
- Waste disposal;
- Investigation in case of accidents;
- EHS management, including EHS supervisor to liaise with Zhaikmunai;
- Rights and responsibilities of personnel; and
- General requirements i.e. inspections carried out by the Company.

In addition to the abovementioned pre-qualification process to be completed by Contractors prior to award of any contract, Zhaikmunai uphold their own EHS internal standards during contract execution through the following methods:

- EHS audits and inspections of all aspects of work by Zhaikmunai and/or Third parties;
- Provision of all reports making available all necessary documents, services and facilities to enable the proper performance of such audits or inspections;
- Compulsory appointment of EHS representative to be responsible on behalf of the Contractor;
- Compulsory training in EHS aspects and provision of appropriate Personal Protective Equipment (PPE), medical and first aid facilities for personnel employed on-site;
- In case of violations, contractors are required to send corrective actions to the Zhaikmunai EHS Director; and
- Each month subcontractors provide reports on EHS performance and submit a report to Zhaikmunai EHS Director.

Zhaikmunai does not currently hold any certifications in quality or environmental management systems, but AMEC was informed by the HSE director that they plan to obtain accreditation in the next few years.

4.2 Organization of EHS management

Zhaikmunai's HSE Department is an independent structural division of the company. It is headed by the Head of Department, which is directly subordinate to Administrative director of the company and the structure of the Department and number of personnel are approved by the Administrative director based on the scope and conditions of work. By its status the HSE Department is in the same position as other operational departments, but its decisions on HSE issues are binding for managers and employees of departments, services and hazardous industrial facilities of Zhaikmunai.

There are seven members of staff who are dedicated to management of HSE at Zhaikmunai's facilities, they are displayed in Table 5 below.

Table 5: HSE Management at Zhaikmunai Facilities

№	Name	Position
1	M. Uteshev	Head of Dept.
2	A. Zobnin	Deputy Head of Dept.
3	Zh. Zhaksylykov	HSE Field Engineer
4	S. Kenzhebaev	HSE Field Engineer
5	V. Vahitov	HSE Field Engineer
6	A. Zhusupkaliev	HSE Field Engineer
7	A. Badashev	HSE Field Engineer

4.2.1 Security

Zhaikmunai's major facilities are enclosed by a secure perimeter fence, a manned security checkpoint and CCTV cameras (Appendix E, Photograph 19, Appendix F, Photograph 14). At the Oil Terminal a security checkpoint is stationed at the entrance to the facility, which houses CCTV for the site and all security facilities. CCTV at the OTU is located in the Operations Room and not in a specialised security checkpoint, however two process operators are on duty 24/7 to monitor the CCTV cameras and they have directly communication to the security staff in the field.

At present the Camp at the OTU does not have a secure perimeter fence, however according to Zhaikmunai the equipment for this fencing has been purchased and it will be installed within the next few months. The licence area of the Field is too large to enclose with a perimeter fence. Instead Zhaikmunai commission a security firm called Okhrana Kazakhstan Military Service LLP (KMS) to provide surveillance and security support. There are security personnel located at the entrance to the Field, at the OTU, the Oil Terminal and each drilling site. Security staff from KMS have professional training to perform security activities and a license from the Ministry of Internal Affairs (Document HS52) issued on 27th October 2004 (License no.000879, to provide all types of security services). Zhaikmunai management confirm that they have had no issues with the security services provided by KMS and have had no complaints from employees or local population regarding their performance.

All conservation wells are enclosed by a secure perimeter fence, however the production and exploration wells are enclosed only by clay bunding and do not have secure perimeter fencing (Appendix E, Photograph 3). As the Field area is dominated by agriculture and animal husbandry, there is the potential for disturbance to well facilities from humans and animals.

To ensure that Zhaikmunai's facilities comply with the Environmental, Health, and Safety Guidelines – Onshore Oil and Gas Development (IFC), AMEC recommends

that all operational facilities at the Chinarevskoye Field be contained using secure perimeter fencing to prevent harm to any persons or animals that come across facilities and to prevent accidental damage to facilities.

4.2.2 Fire Safety

There are several areas of Zhaikmunai's facilities that are considered a fire hazard due to the inherent combustible nature of hydrocarbons being handled/stored. The OTU site is categorized as Class B-1г in terms of fire and explosion safety (acc. to Electrical Installation Regulations), Categories А, Б, Г, Д (acc. to РНТП 01-94).

From the extent possible, during a visual walk through site inspection of the OTU and the Oil Terminal, the fire safety system appeared to be adequate and in a good state of maintenance, with dedicated firewater storage and foam production units and pump house.

Both the OTU and the Oil Terminal have two fire-fighting tanks on site, each with a capacity of 1,000m³ (NP1 and NP2) (Appendix E, Photograph 32). All of these tanks can be re-filled in 24 hours using groundwater abstraction wells located on site.

All facilities at the OTU and the Oil Terminal have a fire detection system which is linked to the main Operations Room and to the on site fire brigade. The OTU, Oil Terminal and associated vessels were noted to be equipped with both visual and audible fire alarms (Appendix E, Photograph 30). No telemetric alarms were present that would provide a remote warning of incidents occurring at the OTU. However 24 hour surveillance is in operation at the OTU.

At present there are separate fire detection systems for different operational systems at the OTU, however site management report that they will aim to connect them in the near future.

The OTU and Oil Terminal include a fire-fighting system operated on a high pressure pump system, which consists of two pumps with 4bar pressure and one pump with 10bar pressure and back-up diesel generator. A foam/water mix is distributed automatically via a ring main to drench points around the facility capable of suppressing oil fires. The area also a number of small fire-fighting stations situated at various locations across the OTU and Oil Terminal (Appendix E, Photograph 34). All site personnel are trained in fire-fighting drills, while select individuals within shifts are trained in additional fire-fighting measures and rescue using on-site breathing apparatus. Zhaikmunai provided for review examples of this fire safety training that had been undertaken at Zhaikmunai facilities (document HS27-37).

4.2.2.1 *Fire Brigade*

Zhaikmunai have an agreement with the municipal fire crew (Ort Sondirushi JSC) for provision of a fire brigade at the OTU and Oil Terminal (HS39 and HS40) (Appendix E, Photograph 35 and Appendix F, Photograph 16). At both the OTU and the Oil Terminal, there is a municipal fire station which is located in close proximity to the facilities (approximately 50 m) and is in operation on a 24-hour basis. The fire station at the OTU operates 27 personnel in shifts with two fire engines. Each shift includes 16 operational fire-fighting personnel equipped with fire/heat resistant suits and breathing apparatus. The breathing apparatus includes air canisters which last 40 minutes of operational time and compressors for re-filling the air canisters. The Oil Terminal has the same facilities and equipment but each shift includes only 10 staff due to the reduced size and capacity of the Oil Terminal.

Fire brigade staff remains in the Field on a weekly rotation to ensure there is always a full team of personnel in case of emergency. Camp provisions for the fire brigade personnel are provided by the contractor and on inspection appeared to be of a good standard.

The fire brigade are automatically alerted if a fire occurs and they also then contact the local authorities to alert them of the situation.

The company maintains a compulsory Ecological insurance policy which includes fire insurance (doc: 1.9 f).

4.2.3 Emergency Response and Control of Major Accident Hazards

Zhaikmunai have a number of emergency response plans for all possible emergencies at exploratory drilling sites, the OTU, the Oil Terminal and the oil pipeline;

- Emergency Response Plan for Oil Pipeline Crossings with Transit Gas Pipeline (document HS5) – There are two gas pipelines 'Soyuz' and 'Okenburg Novopskov' which are crossed by Zhaikmunai's 120 km long oil pipeline. This emergency response plan co-ordinates actions between two companies in case of an incident. It has been approved by MERD and the local environmental department;
- Emergency Response Plan for drilling works, operational facilities in the SPZ and within the exploration area of Chinarevskoye with H_2S content (document HS6). This Plan has been approved by MERD; and
- Liquidation plan for possible emergencies at the OTU (document HS 57) which has been approved by MERD.

Zhaikmunai's emergency response plans include actions for villagers located close to their facilities. This includes conducting seminars in the local villages about the H&S risks and providing emergency transport for the entire population of the villages in case of an emergency.

Zhaikmunai have a contract with QHSE-Akbarys to provide all equipment for H_2S services which include a full time site supervisor; H_2S awareness training, H_2S sensors and breathing apparatus (document HS7).

Zhaikmunai also have specific protocols for any activity with high fire risk or explosion risk. This includes;

- The use of explosion-proof equipment;
- Constant presence of a fire engine and trained personnel; and
- A gas detector to constantly measure the level of gas in the air.

All of Zhaikmunai's facilities are equipped with breathing apparatus and a gas detection system which is monitored by the Operations Room. Staff are alerted to any emergencies by a series of alarms which are located around Zhaikmunai's facilities.

4.2.3.1 *Drilling Wells*

There is a high risk of H_2S leaks at drilling wells, therefore a detailed H&S system is in place for this, which is in accordance with IFC Environmental, Health, and Safety Guidelines – Onshore Oil and Gas Development. H&S signs are located at the entrance to sites and gas and fire detection sensors are set up around the rigs (Appendix E, Photograph 29). If the levels of H_2S increase to 10ppm in any one location, an automatic alarm is activated and staff follow emergency procedures and the site is closed until the levels of H_2S drop. Drilling rigs have breathing apparatus for all staff. These apparatus have 30 minutes worth of air supply and can also be connected to a casket system which provides further air supply, if required.

Emergency drills around rigs are conducted each quarter. The schedule for emergency drills for 2009 was reviewed by AMEC in the H&S offices at the OTU and the Oil Terminal.

4.2.3.2 *Emergency Response Team and Emergency Coordinators*

Zhaikmunai has emergency response crews at the OTU and the Oil Terminal. The emergency response team at the OTU consists of four crews, each with 10 people.

The emergency response crew at the Oil Terminal consists of 4 crews each with 5 people. The emergency co-ordinator is the Chief Operational Officer, E. Verseck.

Zhaikmunai carries out regular emergency response drills and the last ones were completed in March and April 2009.

First Aid facilities are provided at all Zhaikmunai facilities, but the nearest licensed medical facility and police department to the OTU are located in the village of Daryinsk, which is located 62 km from the OTU. The nearest medical facilities and police department to the Oil Terminal are located in the village of Beles, which is located 2 km from the Oil Terminal. Zhaikmunai routinely provide these emergency facilities with details of their emergency response plans and keep them informed of emergency situations at their facilities.

4.2.4 Staff Training and Supervision

Zhaikmunai has a written H&S training schedule (document HS1) which identifies all of the different categories of training to be undertaken by staff in 2009. Among others, this includes:

- Hazardous materials handling
- Hydrocarbon spills;
- Fire drills at the OTU and Oil Terminal;
- Fire drills in apparatus room;
- Oil spills on roads;
- Damage to the oil pipeline;
- Risk of gas poisoning;
- Risk of gas in technical facilities of OTU; and
- Chemical spills.

Details of all EHS training undertaken by staff is kept in the EHS offices at the OTU and the Oil Terminal and is kept up-to-date by the EHS engineer. Day-to-day EHS training is co-ordinated by the EHS engineers at the OTU and the Oil Terminal. EHS training needs for the upcoming year are identified in the H&S Action Plan and training schedule which is prepared by senior EHS management and approved by the MERD.

Zhaikmunai staff also must complete a series of EHS inductions;

- Head office EHS induction;
- Site induction;
- EHS induction for each day's activities; and
- EHS Tool box talks and seminars.

AMEC was provided with registers of all inductions at both the OTU and the Oil Terminal which were signed by all staff, their supervisors and the EHS engineer responsible for the site. These inductions are also attended by any contractors working at Zhaikmunai facilities.

Each employee must also pass an H&S training course and exam, which is provided by a specialised EHS training company, QHSE. This exam is taken and passed every 3 years by all members of Zhaikmunai staff and some engineers are required to take it once a year. AMEC was provided with a register of employee names and dates of when the exam was passed and the date required for renewal (HS18 & HS19). This process has been approved by MERD.

4.2.4.1 *EHS Inspections*

Daily H&S inspections of the workplace are undertaken at the OTU and the Oil Terminal by the EHS supervisors and weekly H&S inspections are undertaken by the head of each facility. If any violations are discovered they are reported to the EHS Director who is then responsible for ensuring that any issues are resolved.

H&S inspections are also carried out for any contractors working on site. These are normally undertaken by heads of the facilities and occur twice a month and aim to identify;

- Any violations;
- Provision of PPE to the employees (checked once per quarter);
- Number of employees who received a disciplinary action for violation of H&S rules;
- Number of accidents;
- Number of fires; and
- Information on Safety and Health Department – total number of employees.

4.2.5 Internal and External Stakeholder Dialogue

EHS information is provided to employees via a series of tool box talks and seminars throughout the year. Zhaikmunai also provides EHS seminars to the local villages.

Any complaints are sent to the General Director of Zhaikmunai, who co-ordinates with the relevant department to resolve the issue.

5 COMPANY ENVIRONMENTAL PERFORMANCE

5.1 Regulatory Frameworks

5.1.1 Local/National Regulatory Requirements

5.1.1.1 *Environmental Code of the Republic of Kazakhstan (RoK)*

The principal guiding legislative instrument in Kazakhstan regarding the natural environment is the Environmental Code of the Republic of Kazakhstan, dated 9 January 2007, No. 212-3 (the "Code").

The Code governs the relationship arising out of the protection, restoration and preservation of the environment, use and reproduction of natural resources in the course of carrying out business or other activities, which involve natural resource use and impact on the environment, within the territory of the Republic of Kazakhstan.

Basic principles of the Environmental code are:

- Sustainable development;
- Government control in the region of the environmental protection and the natural resources consumption;
- Polluter pays;
- Accessibility of ecological information;
- Application of the best availably techniques (BAT) for impacting on environment and natural resources consumption;
- Presumption of ecological hazard of all forms of activities; and
- Mandatory requirement to undertake environmental impact assessment.

Whilst the Code has only been implemented recently in Kazakhstan, AMEC have assumed a gradual change in Kazakhstan legislation to more stringent international standards, similar to that of the European Union, and typical of other industry examples in Eastern Europe, Accession Countries to the EU (such as Turkey and Romania) and the Former Soviet Union.

5.1.1.2 *Operational Permitting*

In order for an organization to undertake activities relating to nature use (municipal construction, land area improvement, installation of pipelines and facilities) there is an obligation under Republic of Kazakhstan Environmental legislation to obtain a "Permit for Emission", specific to the period of operations.

On approval of the permit application, the organization becomes authorized to carry out proposed operations within the terms of the application. Once operations come to an end, a State Environmental Control Committee evaluates the state of the operational area prior to expiration of the permit. Certain fines and penalties are imposed on organizations in cases of non-compliance with the State Environmental Conservation Requirements.

Intrusive activities (geological works, exploration development and production drilling and seismic operations) require a Subsoil Use Permit. To obtain the Subsoil Use Permit an annual "Work Program" for subsoil use is submitted to the Regional Geology and Subsoil Use and Protection Committee. The contract is arranged on approval for several years.

5.1.1.3 *Environmental Permitting*

As discussed in the abovementioned Section, a number of Permits are required under RoK law. During the AMEC site visit the following operating and resource exploitation permits were made available for review:

- Ministry of Environmental Protection
  - Nature Use Permit #0055159 – 13.06.08- 31/12/2010 (document 1.2 a-e and Appendix C)
  - Water Abstraction and re-injection permits (Appendix C)
- Ministry of Energy and Mineral Resources
  - Licence Granting the Right to Use the Subsurface in the Republic of Kazakhstan – MG-series #235-D (oil) – 26.05.1997 (License to exploit the subsurface at the Chinarevskoye oil Field for 30years) (document 1.5 g and Appendix C)
  - Licence for production facilities with potentially hazardous activities #002113 - 09.12.2003 (Document 1.5 b and Appendix C)

As part of the process of environmental permitting, a company must obtain approval of an Environmental Impact Assessment (EIA) for each project being undertaken. Approval of EIA's for all Zhaikmunai's projects can be seen in Appendix D documents 1.5 l to 1.5 gg).

The above referenced permits comprise the currently necessary regulatory authorisations required to operate and develop the Chinarevskoye Field in line with reported Zhaikmunai ambitions. However, future permits will be required for later phases of Field development and permits and others will require annual renewal, such as the Nature Use Permit.

For the exploration and production activities carried out by the Company, it would appear that all permits have been obtained for activities currently carried out. This

includes air emissions permits, water abstraction permits, water disposal permits, and emissions permits.

5.1.2 International Standards/Guidance

Further to Kazakhstan regulations, reference during the audit to World Bank International Requirements and Standards was also used when applicable. This includes;

- IFC Environmental Health and Safety Guidelines for Onshore Oil and Gas Development (2007) ; and
- IFC Environmental Health and Safety General Guidelines (2007).

As of 30 April 2007, new versions of the World Bank Group Environmental, Health, and Safety Guidelines (known as the 'EHS Guidelines') were issued.

The EHS Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP), as defined by the International Finance Corporation's (IFC).

The EHS Guidelines contain the performance levels and measures that are normally acceptable to 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.

Furthermore industry sector guidelines from the IFC exist for “Onshore Oil and Gas Development” which have been noted during the environmental health and safety audit. The document specifically addresses industry specific impacts and management as well as performance indicators and monitoring.

Reference has also been made to The European IPPC Bureau reference documents on Best Available Techniques, called BREFs. (EU BREF). EU BREF documents provide information on a specific industrial/agricultural sector in the EU, techniques and processes used in this sector, current emission and consumption levels, techniques to consider in the determination of BAT, the best available techniques

(BAT) and some emerging techniques. Where applicable, reference has been made in this report to the EU BREF for Emissions from Storage (07.2006).

5.2 Water Sourcing and Consumption

The regulatory agencies with which Zhaikmunai deals with for water sourcing and consumption are the Water Department of Western Kazakhstan and the Ministry of Agriculture of the RoK.

There are four water tanks in the OTU;

- Technical water tank (T301/2), capacity 1,000m³
- Reservoir Water tank (T301/1), capacity 1,000m³ (Closed tank, Photograph 9, Appendix E)
- Two fire water tanks (NP-1 and NP-2), capacity 1,000m³ each.

All water tanks have water transfer pumps, and the technical and reservoir tanks have water heaters. Tanks are constructed of steel plates and are 6-8mm thick. Technical water is obtained from groundwater abstraction wells and from process wastewater which is filtered through sediment tanks and pumped into the technical water tank for re-use.

The reservoir tank has been built specifically for re-injection purposes and only water of a higher quality will be stored in this tank for re-injection. Water to be used for re-injection will be treated by a WWTP before it is re-injected.

There are a number of water wells in operation at Zhaikmunai facilities, these include groundwater abstraction wells and re-injection wells. Water wells constructed by Zhaikmunai are 219-168 mm in diameter and the wellhead is cemented with cement pad, sized 0,7-0,5 m. All stationary water wells are enclosed by a cabin and the average pumping rate is 0,17-0,58 dm^3/s. The Company obtains authorisation for water use and abstraction from the Water Department of Western Kazakhstan and permits are granted by the Ministry of Agriculture (MoA) of RoK. As a condition of the permits from the MoA, all wells include a pressure gauge and a metering system to monitor volume of groundwater use. Table 6 below indicates the number of wells in operation in 2008 and for Q1. 2009.

Table 6: Groundwater Usage

Operating wells 2008			Operating Wells Q1.. 2009		
Water Well	**Type**	**Status**	**Water Well**	**Type**	**Status**
2581	Abstraction	Approved	2581	Abstraction	Approved
2700	Abstraction	Approved	2700	Abstraction	Approved
2308	Abstraction	Approved	2308	Abstraction	Approved
2704(32)	Abstraction	Approved	2704(32)	Abstraction	Approved
2708(115)	Abstraction	Approved	2708(115)	Abstraction	Approved
2707(51)	Abstraction	Approved	2707(51)	Abstraction	Approved
2702(31)	Abstraction	Approved	2702(31)	Abstraction	Approved
2709(57)	Abstraction	Approved	2709(57)	Abstraction	Approved
2703(27)	Abstraction	Approved	2703(27)	Abstraction	Approved
26110	Abstraction	Approved	26110	Abstraction	Approved
26111	Abstraction	Approved	26111	Abstraction	Approved
2705, 05a	Abstraction	Approved	2705, 05a	Abstraction	Approved
2827(121)	Abstraction	Approved	2827(121)	Abstraction	Approved
2828(52)	Abstraction	Approved	2828(52)	Abstraction	Approved
2826(62)	Abstraction	Approved	2826(62)	Abstraction	Approved
(28150) 65	Abstraction	Approved	(28150) 65	Abstraction	Approved
(28151)63	Abstraction	Approved	(28151)63	Abstraction	Approved
R3	Re-injection	Approved	2735	Abstraction	Approved
			2901(119)	Abstraction	Awaiting approval from MoA
			R2	Re-injection	Approved
			R3	Re-injection	Approved

5.2.1 Abstraction Wells

Groundwater is abstracted for technical use in oil treatment processes at the OTU, including de-salting and heating of certain units and as part of the approved well development approach, a water abstraction well is installed at each exploratory well location in order to supply water for technical uses, typically the production of drill slurry to facilitate drill progression at depth.

There are 19 abstraction wells currently in operation across the Field, which are typically to a depth of 50-70 m (Appendix E, Photograph 8). In accordance with the Environmental Code of the RoK (Article 221) Zhaikmunai have permits for all abstraction wells operating at the OTU in 2009 which detail that abstraction of groundwaters can be undertaken for production needs at the Field (document 1.3 i – t). AMEC reviewed the special water permits for abstraction wells and volumes of water consumed at each well (see Table 7 below) and all wells were in compliance with their permit.

In accordance with Article 221 of the Environmental code, all groundwater monitoring wells are equipped with water control devices, water measuring devices and monitoring stations to monitor the groundwater quality.

There is one well (2901) which has been approved by the Water department of Western Kazakhstan but which is awaiting approval by the Ministry of Agriculture of RoK. There are also several abstraction wells (26110 and 26111) that do not exceed

the regulatory threshold of 50 m^3 per day above which a specific permit for groundwater abstraction is currently not required (document 1.3 h). Zhaikmunai also have a permit for use of groundwaters for domestic needs (well no 2308) at the temporary camp in the Field (document 1.3 g) which is valid until 06th6 August 2011.

The Oil Terminal has two water abstraction wells in operation which are located just outside the perimeter of the site (Appendix F, Photograph 8). Water is abstracted from these wells and stored in two metallic aboveground storage tanks (AST) inside the perimeter (Appendix F, Photograph 9). The main use of technical water at the Oil Terminal is for washing the rail tanks at the oil loading facilities. However site management reported that they are still awaiting permits for these wells. It was reported by site management that they have authorisation from the Water Department of Western Kazkahstan for these wells but they are awaiting final authorization from the MoA. Site management could not provide accurate volumes of water usage for these wells at present as the Oil Terminal has only been operating since 12 January 2009. AMEC does not foresee any problems gaining full regulatory approval for these two water wells.

5.2.2 Re-injection Water Wells

Re-injection water wells are typically to a depth of 950 m and will be used as part of the planned water re-injection plant to maintain reservoir pressure in the condensate layers to ensure continued production of oil and gas. There are eight re-injection wells (R2 – R9) at Zhaikmunai's facilities but they are currently only operating two re-injection wells (R2 and R3) for testing purposes. AMEC reviewed the special water permits for re-injection wells R2 and R3 and volumes of water consumed at each well are in compliance with their permit (see Table 7 below).

At present the volumes of process wastewater that could be re-injected are very low and are currently recycled in the OTU, but once the GTP is commissioned a significant volume of waste process water will be produced. A WWTP is also planned for construction in 2009, which will be used to treat waste process water from the GTP and OTU before it is re-injected. Furthermore once the GTP is commissioned a number of exploratory wells connected to the sub-terrain oil and gas condensate layers will start producing oil which will further necessitate the use of the water re-injection plant to maintain reservoir pressure.

Site management report that by August 2009 the number of operating re-injection wells on site will increase and operation of the re-injection plant will commence. Zhaikmunai hold a special water use permit for production use of groundwater for all re-injection wells (no's R2 - R9) at the Field (document 1.3 f) which is valid till 31 December 2014. This permit states that the volume of water allowed to be re-

injected into the Company's eight re-injection wells is 547,500 m³ per year and it allows the following activities:

- Groundwater re-injection into the reservoir to maintain pressure; and
- Abstraction of groundwater for operational needs and maintenance of reservoir pressure during production of hydrocarbons.

5.2.3 Water Consumption

At present Zhaikmunai are within the limits of their water permits for total abstraction and re-injection for each individual well, as can be seen from Table 7 below.

Table 7: Chinarevskoye Field Water Consumption

Water Consumption, 2008				Water Consumption, Q1. 2009			
Water Well	Type	Permitted Volume (m^3/yr)	Actual Volume (m^3/yr)	Water Well	Type	Permitted Volume (m^3/yr)	Actual Volume (m^3/yr)
2581	Abstraction	17863	8618	2581	Abstraction	17863	1732
2700	Abstraction	17875	5251	2700	Abstraction	17875	1697
2308	Abstraction	17758	8141	2308	Abstraction	17758	1808
2704(32)	Abstraction	4223	2726	2704(32)	Abstraction	4223	0
2708(115)	Abstraction	5128	5128	2708(115)	Abstraction	5128	1500
2707(51)	Abstraction	3748	3545	2707(51)	Abstraction	3748	0
2702(31)	Abstraction	3223	1991	2702(31)	Abstraction	3223	0
2709(57)	Abstraction	3748	2143	2709(57)	Abstraction	3748	0
2703(27)	Abstraction	4273	1368	2703(27)	Abstraction	4273	0
26110	Abstraction	16425	2566	26110	Abstraction	16425	47
26111	Abstraction	16425	3128	26111	Abstraction	16425	2367
2705, 05a	Abstraction	8546	8369	2705, 05a	Abstraction	8546	0
2735	Abstraction	5356	2266	2735	Abstraction	5356	0
2827(121)	Abstraction	3748	3072	2827(121)	Abstraction	3748	160
2828(52)	Abstraction	4273	4163	2828(52)	Abstraction	4273	0
2826(62)	Abstraction	3748	3746	2826(62)	Abstraction	3748	0
(28150) 65	Abstraction	3748	1840	(28150) 65	Abstraction	3748	1908
(28151)63	Abstraction	3748	2354	(28151)63	Abstraction	3748	1394
R3	Re-injection	520	56	R3	Re-injection	68400	9307
Total		144376	70471	R2	Re-injection	68400	7074
				2901(119)	Abstraction	N/A	1554
				Total		144376	30548

5.2.4 Payments for Groundwater Abstraction

Zhaikmunai pays water royalties to the state for the consumption of groundwater for their operational requirements in accordance with tax laws effective at the time of Contract execution (31 October 1997).

For 2008 the actual groundwater consumption in the Field was 70,471 m³ and the royalties paid amounted to 374,201 KZT. There have been no penalties paid for over-abstraction since Zhaikmunai started operating at the site.

It is likely that due to additional infrastructure currently under construction and planned increases in production capacities there will be a significant increase to the rates of water abstraction and usage in the next few years and consequently the payments for groundwater consumption will significantly increase.

5.2.5 Water Quality of Wells

Water Quality Analysis is undertaken for each well operated by Zhaikmunai and a well passport is completed.

Technical water and fire water at the OTU are abstracted from wells 26110 and 26111 and the quality of this water is analysed by Zhaikmunai's laboratory to ensure it meets regulatory requirements. Example results of this chemical analysis can be seen in Appendix L.

Zhaikmunai provided an example well passport for R3 (test re-injection well) (document 1.7 b) which was undertaken by Zhaikmunai's laboratory. Re-injection water must be of a high quality so water is filtered at a Water Treatment Unit before injection. A regular internal inspection of water filters and water samples are undertaken to check the presence of mechanical impurities. The quality analysis is illustrated in Table 8.

Table 8: Water Quality Analysis Well R3

Laboratory Testing of Water Quality at R3		
Name of component	**Before filter**	**After Filter**
Density g/dm^3	1100	1100
pH	5	5
Mechanical substances mg/dm3	19.6	18
Minerals mg/ g/dm^3	146476	146476
Co3 mg/ g/dm^3	Not found	Not found
Hco3 mg/g/dm^3	Not found	Not found
Chloride mg/g/dm^3	86437.5	81446
Calcium mg/g/dm^3	5611.2	5611.2
Manganese mg/g/dm g/dm^3	2600.4	2600.4
Hardness of water mg equivalent/m^3	445	445
Bacteria total no per ml	Not found	Not found
Soft Oxygen ppb	Not found	Not found

Before water wells become operational, the geological structure and water quality are analysed for suitability. Zhaikmunai provided examples of this analysis carried out at well No. 1, 26110 and 26111 (document 1.7 c, 1.7 d and 1.7 e), which were investigated by Zhaikhydrogeologiya and Uralsk Neftegas Geologiya before they were pronounced technically ready for exploitation.

It should be borne in mind that additional infrastructure currently under construction (namely the GTP) and planned increases in production capacities will likely result in a significant increase to the current rates of water abstraction and usage. Consequently, further permits for groundwater abstraction at the OTU will likely be required in the future. There were no obvious or reported indication that such a permit would not be readily forthcoming and Zhaikmunai is currently well within the limits of it's current permitted volumes for water abstraction and re-injection.

5.2.6 Potable Water

Potable water, meeting required drinking standards, for all Zhaikmunai facilities is supplied by a company, Firma Lodnik LLP. They have an agreement for 2009 (Document 1.3 x) to supply Crystalmaya water in 1.5 litre, 5 litre and 19 litre bottles for all Zhaikmunai facilities.

5.3 Energy Sourcing and Consumption

5.3.1 Energy Sources/Supply

There is one substation just outside the OTU, which is connected to the state power transmission lines from Chinarevo (Western Kazakhstan), which has a capacity of 35kW and 10kW. This provides electricity for the majority of Zhaikmunai facilities at the Field. There are two power transformers inside the OTU, one which converts it to a 10kW rating for transferral via overhead lines (OHL) to the rest of the facilities and for use in the export pumps and another which converts it from 10kW/400kW for general use in the OTU. Overall there are 39 transformers in use at the Field which range from 40-2,500kW capacity. The system of cooling and isolation at the OTU is carried out using oil and Zhaikmunai do not use condensate batteries. There are eight boilers at OTU.

The majority of production wells use pressure from the sub-terrain condensate layer to operate. Only one production well uses an electric pump. However all production wells are connected to the electricity supply via OHL which is used to generate lighting at all production and conservation wells.

There are seven diesel generators across the Chinarevskoye Field, four of which are located at the OTU and in the temporary camp. Two diesel generators are located at the SAIPEM drilling rig as this is not currently connected to the OHL. However site management reported that they plan to connect all future exploration wells to their

existing electrical power supply. There is also an emergency diesel generator at the Oil Terminal (750kW)

There is currently one heater (emissions source) at the OTU.

The Oil Terminal is linked to a gas pipeline from KazTransGaz, which is used for heating purposes. It is used to heat water for washing of the oil loading area and to heat water for controlling the temperature of the bulk oil storage tanks (use ½ water ½ antifreeze mix). Electricity at the Oil Terminal is obtained from two OHL:

- One from Rostoshi village; and
- One from Chuvashka village.

5.3.2 Energy Efficiency

In future, site management report that they will get most of their power supply at the OTU from the GTP once it is commissioned. The GTP will have three turbines, each with capacity of 6kV which will be used to generate power for most of the Field activities.

Zhaikmunai provided details of their power consumption and associated costs from 2006 – 2008 (document 2.1 a):

- 2006 – 2,800,000kW/hour
  - 2006 – 16,303,529. 68 KZT.
  - Reactive power – 36,777 KZT;
- 2007 – 4,940,000kW/hour
  - 2007 – 28,048,350.29 KZT
  - Reactive power – 253,756. 35 KZT; and
- 2008 – 6,650,000kW/hour.
  - 2008 – 45,530,685.26 KZT
  - Reactive power – 144,376.49 KZT.

The equipment used for measuring primary energy supplied and consumed is a power metering device which is installed at the substation outside the perimeter of the OTU (35kW and 10kW) connected to the OHL from Chinarevo.

Zhaikmunai estimates that the current volumes of electricity consumption will be significantly reduced once the GTP is commissioned. This will include a gas powered generator of total capacity of 45mWA, which will allow Zhaikmunai to drastically reduce their consumption of electricity from the national grid. The construction and commissioning of an additional gas powered generator (18 mWA capacity) is also planned to be built at a later stage as part of the GTP and may allow commercial power supply.

5.3.3 Greenhouse Gas Contribution

Greenhouse gas contribution for Zhaikmunai in 2008 is shown below in Table 9. The percentage of these emissions that can be attributed to gas flaring can also be seen in Table 9. The total percentage of emissions from gas flaring accounts for the majority of the greenhouse gas contribution from Zhaikmunai Facilities. Once the GTP is commissioned these emissions will be reduced by 98% and consequently Zhaikmunai's greenhouse gas contributions will be significantly reduced.

Table 9: Greenhouse Gas Contribution 2008

Air Emissions 2008 (tonnes)	Q1.	Q2.	Q3.	Q4.	TOTAL Emissions in 2008	Including those from stationary sources	% Emissions due to Gas Flaring
Nitrogen Dioxide	62.79881	66.64872	81.19376	61.74901	272.3903	18.410	93.2
Nitrogen Oxide	1.27744	1.19253	1.20737	1.19189	4.86923	4.86923	0
Sulphur Dioxide	24.81741	14.06353	16.95173	13.14676	68.97943	6.849	90.0
Carbon Dioxide	398.8895	425.7854	519.44598	392.41491	1736.53579	20.109	98.8
TOTAL (tonnes)	**487.78316**	**507.69018**	**618.79884**	**468.50257**	**2082.77475**	**50.237**	**97.6**

5.4 Wastewater/Effluent Volume and Quality

5.4.1 Process Wastewater at the OTU

There is no process wastewater from the OTU at present. Any process water is separated from oil and stored in sediment tanks at the OTU where any oil sediment is skimmed from the top. The water is then pumped into the technical water tanks or the reservoir tank for testing of re-injection wells. Most wastewater goes into the technical water tank to be re-used in the OTU.

Waste process water will be used for reservoir re-injection once the water re-injection plant and the GTP are commissioned. The company plans to increase the practice of process water re-injection in line with the development of the Field and increased production, with the aim of utilising wastewater and maintaining reservoir pressure at depth. Water used for re-injection will need to be of a very good quality so the water in the reservoir tanks will be analysed before re-injection, however this process is not in operation yet. The Company are still in the process of testing re-injection at well No. R3 and R2. Although this is not in practice at present, Zhaikmunai have permits for re-injection for all eight re-injection wells (see Section 5.2.2).

5.4.2 Drilling Wastewater

The exploratory drilling well operated by SAIPEM has a temporary water abstraction well, which is used in the drilling process in order to supply water for the production of drill slurry to facilitate drill progression at depth. This wastewater is currently combined with drilling waste and stored in hydro-isolated pits where it is evaporated before the pit is rehabilitated.

5.4.3 Domestic/Sanitary Wastewater at OTU

Domestic/sanitary wastewater arising from camp facilities and office blocks across the OTU is collected within a local septic tank (100 m³ capacity) and is collected and disposed of by a licensed contractor from Uralsk. Zhaikmunai have an agreement with Oral Su Arnasy Co. (state enterprise) (Document 1.3 c and 1.3 u) who provide this service. Example waste acceptance notes issued by Oral Su Arnasy Co.(document 1.3 w) were provided by Zhaikmunai for review, identifying that some 22,000m³ of sanitary water had been removed to the municipal water treatment works in 2008 and that the total amount of fees paid in 2008 was 1,439,394 KZT. According to the Environmental Code of the RoK (Article 283) the right of ownership and responsibility for safe handling of wastewater is passed on to Oral Su Arnasy.

Domestic wastewater is not treated on site and sampling of the domestic wastewater is the responsibility of the contractor. Wastewater is transported from the Field to the municipal water treatment facility at Uralsk, which is owned by the State Public Utility Company, Oral Su Arnasy, and has a design capacity of 50,000 m³ per day. The treatment of waste water at the municipal treatment facility is based on the 'Rules for Reception of Process Wastewaters to Uralsk Sewage System' which have been approved by Akim of Uralsk City and agreed with the West Kazakhstan Environmental Department.

Drilling contractors dispose of their own domestic wastewater, for which they have a separate permit.

5.4.4 Process Wastewater at the Oil Terminal

Any process wastewater at the Oil Terminal is filtered and treated by a WWTP and then recycled into the system. The main process wastewater at the Oil Terminal originates from water used for washing the rail tanks at the loading station. This is collected into an underground sedimentation tank with a capacity of 40 m³ (T6301) (Appendix F, Photograph 13), from which the oil is skimmed off the top. The filtered

water is then transferred to a metallic tank with capacity of 40 m³ (T6302) from where it is transferred to the WWTP.

5.4.5 Wastewater Treatment Plant

The WWTP uses a number of methods to treat wastewater. It uses a two phase filter and a mechanical rotation tank from which oil and sludge are filtered out and stored in a separate underground tank with a capacity of 40 m³. The remaining water is then chemically treated and stored in a separate purified underground water tank with a capacity of 40 m³, which can then be re-used as process water at the site (Appendix F, Photograph 15).

Domestic wastewater at the Oil Terminal is also transported to the WWTP to be recycled for use as process water.

5.5 Air Emissions Volumes and Quality

5.5.1 Gas Flaring at the Oil Treatment Unit (OTU)

The principal sources of atmospheric emissions associated with operations of Zhaikmunai arise from the flaring of associated gas produced as a by-product during oil production and well testing. The Company currently operate two gas flaring stacks in the OTU, which operate on a 24-hour basis and flare 100% of the associated gas being produced. However, once the GTP is commissioned around 98% of associated gas will be utilised.

In amendments to RoK Law "On Petroleum" dated 28 June 1995 (the "Petroleum Law"), on 1 July 2006 a prohibition of the flaring of associated or natural gas in Kazakhstan was passed. These amendments entitle the government of RoK to fine any companies carrying out unauthorized gas flaring. Consequently companies are in the process of developing programmes of associated gas utilisation during production of hydrocarbons which provide for a gradual reduction in gas flaring practices. Kazakhstan hopes to end all gas flaring by 2012 but in reality this depends upon oil producer's ability to invest in the necessary infrastructure and the price of gas in the domestic and international markets.

As many of these gas utilisation programmes are still in the early stages of commissioning, RoK regulatory authorities are currently issuing permits for gas flaring, however the ecological fees associated with this practice have significantly increased. The amendments stipulate that permission to flare gas can only be granted in conjunction with Ministry of Energy and Mineral Resources (MEMR) and

MEP in order to ensure that associated and natural gas utilization programs are carried out and they are in compliance with environmental legislation.

The regulatory agencies with which Zhaikmunai deals with on air pollution matters is the Sanitary and Epidemiological Department of Western Kazakhstan and the Ministry of Environmental Protection (MEP) of the RoK. Zhaikmunai have a Nature Use permit (Document 1.2 a - e) for flaring of associated gas which was approved by the MEP on 1 October 2008. This states the volumes of gas flaring allowed:

- Production wells – 01/01/2009- 31/10/2009, 122 million m^3; and
- Exploration wells – 01/01/2009-01/07/009, 80 million m^3 (once Zhaikmunai submit gas flaring reports for Q1. and Q2. 2009 the permit for Q3. and Q4. 2009 will be issued).

The actual volumes of gas flared by Zhaikmunai are presented in Table 10 below. Zhaikmunai are currently within the limits of their permit for flaring of associated gas and they have not paid penalty fees associated with gas flaring since 2006.

Table 10: Volumes of Flared Gas 2000-2009

Month	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Jan		562.05	1,016.80	1,764.00	2,456.52	1,950.25	2,321.30	26,931.40	6,224.30	10,468.60
Feb		461.68	916.76	3,050.78	2,233.59	1,735.85	4,622.20	25,063.60	6,550.70	10,695.50
Mar		714.78	1,044.25	4,464.62	2,110.15	1,918.34	5,890.40	30,818.60	8,812.30	10,597.10
Apr		725.90	1,651.75	2,028.50	2,234.30	1,871.40	7,485.90	16,038.10	9,353.40	
May		835.74	2,221.15	1,780.22	2,234.57	1,946.30	8,378.20	19,612.70	6,737.00	
Jun		908.22	2,081.76	1,657.16	2,016.05	2,220.00	6,334.40	26,594.70	6,997.90	
Jul		905.83	2,089.50	2,978.00	2,271.15	2,329.60	4,831.80	29,196.90	6,955.90	
Aug		898.09	1,885.26	2,620.02	2,463.08	2,026.90	7,210.40	31,479.40	11,080.40	
Sep	669.56	787.61	1,667.59	2,759.09	1,969.50	2,048.20	22,117.20	29,206.70	10,468.60	
Oct	661.51	812.07	1,707.50	3,047.00	2,025.30	2,069.30	33,453.20	7,451.90	7,729.90	
Nov	612.48	768.99	1,751.42	2,191.94	1,876.91	2,237.20	30,523.80	8,329.00	6,035.40	
Dec	633.20	988.50	1,429.00	2,490.00	2,265.55	2,480.30	21,246.00	8,117.00	7,454.20	
Total	**2,576.75**	**9,369.46**	**19,462.74**	**30,831.33**	**26,156.67**	**24,833.64**	**154,414.80**	**258,840.00**	**94,400.00**	**31,761.20**
Total	**652,646.59**									

The current permit for gas flaring is valid until 31 December 2009 and Zhaikmunai report that the GTP will be commissioned in November 2009. If the GTP is commissioned before the end of 2009, this will automatically eliminate the need for gas flaring and will prevent the payment of any penalty fees when the gas flaring permit expires in 2010. Site management report that it is highly unlikely that the GTP will not be commissioned by 31 December 2009 and in the unlikely event that it is not commissioned by this date, they may still be able to obtain a permit for gas flaring until it is commissioned. If the GTP is not commissioned in time and an additional permit cannot be acquired Zhaikmunai will be required to pay penalty fares for volumes of gas flared. Such a penalty would typically be to the order of 10 times of the standard annual environmental payment for the practice of gas flaring.

5.5.2 Air Emissions at the OTU

Zhaikmunai also have a Nature use permit #0055159 (Document 1.2 a) approved by MEP which covers air emissions from all Zhaikmunai's production facilities, including the Oil Terminal, and is valid from 13.06.2008 – 31.12.2010. It states that permitted volumes of emissions are (tonnes per year):

- 2008 – 4,198.313;
- 2009 – 12,240.21; and
- 2010 – 12,071.774.

Volumes of air emissions for each quarter of 2008 and total volumes of air emissions in 2008 are detailed in Table 11 below. From this Table it can be seen that Zhaikmunai did not exceed their permitted allowance in 2008.

Table 11: Total Air Emissions 2008

Air Emissions 2008 (tonnes)					
Emission to Air	**Q1.**	**Q2.**	**Q3.**	**Q4.**	**TOTAL**
Ion Oxide	0.44058	0.24082	0.24022	0.23997	1.16159
Magnesium compounds	0.00213	0.00153	0.00152	0.00149	0.00667
Nitrogen Dioxide	62.79881	66.64872	81.19376	61.74901	272.3903
Nitrogen Oxide	1.27744	1.19253	1.20737	1.19189	4.86923
Total Hydrocarbons	0.12241	0.12101	0.11903	0.1175	0.47995
Sulphur Dioxide	24.81741	14.06353	16.95173	13.14676	68.97943
Hydrogen Sulphide	0.02144	0.01444	0.01529	0.01214	0.06331
Carbon Dioxide	398.8895	425.7854	519.44598	392.41491	1736.53579
Fluorine compounds	0.00015	0.00006	0.00005	0.00008	0.00034
Methane	10.2729	10.48435	13.2104	10.10521	44.07286
Saturated Hydrocarbons (C1-C5)	24.00507	24.00486	24.00507	24.00507	96.02007
Saturated Hydrocarbons (C6-C10)	0.00177	0.00177	0.00177	0.00177	0.00708
Pentyls	0.00024	0.00024	0.00024	0.00024	0.00096
Benzol	0.00019	0.00019	0.00019	0.00019	0.00076
xylene	0.02064	0.00001	0.11453	0.11453	0.24971
Toluene	0.01188	0.02531	0.06531	0.06531	0.16781
Ethylbenzene	0	0	0	0	0
Benzapyrene	0	0	0	0	0
Glycol ethers (Cellosolve)	0.01166	0.05001	0	0	0.06167
Butyl acetate	0.01825	0.0783	0	0	0.09655
Propenol	0.08876	0.04393	0	0	0.13269
Methanol	0.03589	0.03449	0.03527	0.03479	0.14044
Acetone	0.01797	0.07707	0	0	0.09504
Mercaptan	0.00354	0.00147	0.00171	0.00139	0.00811
Kerosene/Nafta	0	0	0	0	0
Mineral Oil	0.0005	0.00044	0.00043	0.00047	0.00184
Septanol	0.03134	0.02089	0	0	0.05223
White Spirit	0.0493	0.21145	0	0	0.26075
Saturated Hydrocarbons C12-C19	0.87389	0.85908	0.86771	0.86294	3.46362
Corrosion Inhibitors	0.03134	0.02089	0	0	0.05223
Abrasive dust	0.00366	0.00306	0.00366	0.00391	0.01429
Chipdust/wood dust	0.026	0.022	0.024	0.025	0.097
Mineral Dust	0	0	0.03134	0.03134	0.06268
Bi-chloride	0	0	0.03134	0.03134	0.06268
TOTAL (tonnes)	**523.8746**	**544.0078**	**657.56792**	**504.15724**	**2229.60759**

Zhaikmunai pay environmental fees for all emissions to air and gas flaring. The cost of these fees is included in the environmental payment set out in Section 5.10 Current Environmental Expenditure.

Once the GTP is commissioned the amount of gas flared will be reduced by approximately 98%, it is therefore anticipated that once this is in operation there will be a significant decrease in the environmental payments for air emissions.

5.5.3 Air Emissions at the Oil Terminal

Due to installation of VRU at the Oil Terminal, 96-98% of all vapours and gas are recovered. This means that any emissions to air are minimal and are mainly associated with point sources of air emissions such as the diesel generator. Air emissions at the Oil Terminal are included under the Nature Use permit #0055159.

5.5.4 Ambient Air Monitoring

In accordance with Environmental Code of the RoK, Zhaikmunai is obliged to carry out monitoring of ambient air quality and control its emissions. Ambient air quality monitoring is undertaken on a monthly and quarterly basis at the Field by Third party contractors since 2002, the results of which are reviewed and approved by MEP in line with the requirements of operating permits. Samples are taken at Rovhkovo village every month throughout the year and monitoring is undertaken at Chinarevo village and at the border of the SPZ each quarter. From 2001-2007 the samples have not exceeded the permitted levels of operational control. AMEC reviewed the Annual Report of Environmental Monitoring 2008 (Document 1.6 d) which details that ambient air quality monitoring was undertaken by Gidromet LLP who provided analysis of all samples which included testing for mercaptans, H_2S, Sulphur Dioxide (SO2), Nitrogen Dioxide (NO2) and Carbon Dioxide(CO2). This report was approved by MEP and stated that Zhaikmunai did not exceed any set norms for environmental contamination.

Table 12 below show the results of air monitoring at Rozhkovo village for 2008 (document 1.6d).

Table 12: Ambient Air Monitoring at Rozhkovo Village 2008

Air Monitoring at Rozhkovo village 2008													
Compound	**Maximum Permissible Concentration, mg/m3**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sen**	**Oct**	**Nov**	**Dec**
Mercaptan	0,000009	0	0	0	0	0	0	0	0	0	0	0	0
H_2S	0,008	0	0,0036	0,0041	0,0045	0,006	0,006	0,0043	0,0043	0,0064	0,0043	0,0068	0.0041
SO_2	0,5	0	0,057	0,087	0,12	0,069	0,073	0,042	0,070	0,075	0,072	0,052	0.054
NO_2	0,085	0	0,044	0,053	0,045	0,046	0,056	0,049	0,033	0,063	0,058	0,047	0.048
CO_2	5	1,1	0,26	0,26	1,35	2,8	2,9	2,7	1,1	2,0	2,1	1,43	2.43

The annual monitoring plan for 2009 also includes air monitoring every quarter at Beles village which is located 2 km away the Oil Terminal. The Company reports that preliminary air monitoring at Beles village has already been undertaken in 2009 and no exceedance of permissible levels were found. Due to the installation of a

VRU at the Oil Terminal it is unlikely that any issues concerning emissions will affect Beles village.

5.5.5 Point Source Air Monitoring

Zhaikmunai undertakes sampling of air emissions at point sources. The Annual Report of Environmental Monitoring 2008 (Document 1.6 d) includes the results of point source emissions analysis which was undertaken by Gidromet LLP. Samples are taken once per quarter at point sources, which included two diesel generators, two boilers, one oil heater and three heaters. The analysis included testing for Nitrogen Oxide (NOx), Nitrogen (N), SO2, NO2 and CO2. This report was approved by MEP and stated that Zhaikmunai did not exceed any set norms for environmental contamination. The annual monitoring plan for 2009 will also include point source air monitoring every quarter at the Oil Terminal.

5.6 Raw Materials and Hazardous Materials Handling and Storage

The raw materials stored at Zhaikmunai facilities are described below in Table 13.

Table 13: Raw Material Volumes and Storage

Raw Material	Storage Area	Source	Amount Consumed
Demulsifying agent (DMO 86319)	Cold Storage Warehouse & around OUT	Baker Petrolite, UK	3.9m³ per month 42.9m³ per year
Corrosion Inhibitor (CGW85567)	Cold Storage Warehouse	Baker Petrolite, UK	0.75m³ per month 8.25m³ per year
Bactericide (XC80102)	N/A	Baker Petrolite, UK	Not Currently used
Scale inhibitor (SCW 85143)	N/A	Baker Petrolite, UK	Not Currently used
Caustic Soda (NaOH)	46% solution kept in process tank T-1 at OTU	Topan, Uralsk	12.41m³ per month 135m³ per year
Catalyst (Ivkaz)	Cold Storage Warehouse	Vinius, Kazan, Russia	2.5kg per month 30kg per year
Anti-freeze	Oil Terminal		3.9m³ per month 42.9m³ per year
Drilling solution	Drilling wells		Responsibility of contractor

The regulatory agencies which deal with material handling and storage are the State Sanitary Department of Western Kazakhstan, the Ministry of Health of the RoK and MEP.

There are several separate areas/designated facilities for storage at the OTU. There are two cold storage areas for chemicals and raw materials which have approval from MEP (documents HS46 and 47). There is one warm storage area for equipment which also has approval from MEP (documents HS43, 44 and 45). There is also a garage used for storage of transport in the winter. Zhaikmunai was granted permission for all temporary storage by the Customs Office of the RoK on 16 January 2009 (document HS41) for 380m² in the production zone for storage of oil production equipment, chemicals and oil at the temporary settlement of the Field.

The cold storage areas at the OTU consist of a lockable large warehouse with a corrugated iron roof and a concrete floor (Appendix E, Photograph 27) and all materials are stored in plastic drums, plastic cartons and bags on wooden pallets raised off the ground (Appendix E, Photograph 26 and 28). There are no drains within the cold storage warehouses, no spill kits and no secondary containment in the case of a spill. Any chemical spill inside the storage warehouse could migrate off the concrete floor to the soil outside the storage warehouse. To ensure that Zhaikmunai facilities comply with requirements set out by EU BREF, AMEC recommends that a robust method of secondary containment, such as a 6-12" concrete lip/bund be installed to the floor around the warehouse perimeter or inside the warehouse, as an obligatory measure to protect against any spills or leaks. Zhaikmunai informed AMEC that they plan to build a designated chemical storage area which will include a concrete plate, drains, fire fighting systems and adequate facilities to accommodate a spill, however a date for construction of this storage area has not been set.

Oxygen canisters are stored at various locations across Zhaikmunai facilities including the OTU, drilling wells and Oil Terminal. These are stored separately in lockable raised metal containers. It was noted on the site inspection that several of these containers did not appear to be lockable and the doors were merely tied together (Appendix E, Photograph 24). It is therefore necessary that lockable containers be purchased or old containers be mended to facilitate this requirement.

During the inspection of the drilling location operated by SIAPEM, AMEC viewed the areas designated for bulk fuel storage and containment. This had bunded areas compliant with current Kazakh regulations.

5.6.1 Bulk Storage Tanks

The Environmental Code of the RoK states that companies must prevent nature and subsoil pollution, particularly during underground storage of oil, gas and other substances and materials (Article 219). There are a number of above ground storage tanks (AST) and underground storage tanks (UST) at both OTU and Oil

Terminal. Full details of these tanks, including age and details of integrity testing are provided in Appendix K.

There are two bulk oil containers (T302/2; 2,000 m^3 and T302/1; 3,000 m^3) at the OTU. They are both situated on a concrete base in an area approximately 70 m x 30 m, surrounded by a 1 m high bund wall consisting of a soil (clay) embankment. The bunded area appears to have sufficient volume to contain 110% of a catastrophic spill of one of the fuel tanks, and the integrity of this bunding complies with EU BREF requirements (Emissions from Storage) and minimum requirements under RoK regulations (Appendix E, Photograph 21). There are four drains located in this area for rain and storm water drainage; any water collected is diverted to an isolated concrete evaporation chamber.

There are three diesel AST at the OTU, each with a capacity of 50 m^3 which are used for generator fuel storage. These diesel tanks are surrounded by a soil embankment/bund and raised from floor level using concrete slabs. One of these diesel storage tanks is left empty to ensure that in case of a spill, fuel can be transferred into the empty tank. There is also an emergency metallic UST with a capacity of 60 m^3 which is protected with a special paint that isolates products, which can be used to store fuel in case of a catastrophic spill or overflow from the three diesel AST. The bunded area around these diesel tanks appears to have sufficient volume to contain 110% of a catastrophic spill of one of the diesel tanks and the integrity of this storage area complies with EU BREF requirements (Emissions from Storage) and minimum requirements under RoK regulations (Appendix E, Photograph 20).

There are two bulk oil storage tanks at the Oil Terminal, each with a capacity of 5,000 m^3 (Tank numbers T501 and T502) (Appendix F, Photograph 12). They are both situated on a concrete base in an area approximately 200 m x 50 m, surrounded by 2 m high bund wall consisting of a soil (clay) embankment with bitumen upper surface. The bunded area appears to have sufficient volume and be of adequate integrity to contain a catastrophic spill of one of the fuel tanks (Appendix F, Photograph 11). There are four storm water drains located in this bunded area for rain and storm water discharge. These are linked to an isolated underground tank with a capacity of 63 m^3. Any water collected is filtered through dry well shafts before it collects in the isolated underground tank, which is monitored by the Operations Room.

The oil bulk storage facilities at the Oil Terminal were observed to have adequate secondary containment. The upper surfaces of bunded areas were found to comprise mainly of bitumen, which complies with regulatory requirements in Kazakhstan and EU BREF for hazardous materials storage.

All bulk storage tanks have level meters for remote control of liquid levels in the tanks which are monitored by the Operations Room. There is no additional system for leakage identification in tanks.

The oil tanks do not have a sediment extraction system in place and therefore require cleaning every five years. The last tank cleaning of oil tank T-302/1 was undertaken on 18 October 2006 and the total amount of oil sludge recovered was 200 m^3. The last cleaning of oil tank T-302/2 was undertaken in October 2007 and the total amount of oil sludge recovered was 300 m^3. The waste oil sludge is transported off site by a licensed contractor and is taken to a special polygon for utilization by Uniserv.

There has been no cleaning of the bulk oil storage tanks at the Oil Terminal as they have only been in operation since January 2009 and as such do not yet require cleaning.

5.6.2 General Housekeeping

It was noted during the site inspection that a large quantity of the demulsifying agent, used for the Demercaptanization Plant, was left out in the open (Appendix E, Photograph 25). Practices such as this are not in accordance with IFC General EHS guidelines. Such materials should be moved into one of the cold storage areas, or if there is not sufficient capacity, then a new storage area should be constructed, with adequate roof and bunding.

All domestic waste is stored in open metallic containers outside the camp, however such practices are not in accordance with IFC General EHS guidelines, which require waste to be stored in secure and covered areas.

No evidence of spills or vermin was observed by AMEC and apart from the abovementioned observations, general housekeeping around the Company's facilities was found to be good, with all areas neat, tidy and in good condition.

5.7 Waste Management and Characteristics

The main types of hazardous waste produced by Zhaikmunai operations include materials such as;

- Drilling waste;
- Crude;
- Waste oils;
- Contaminated soil;
- Oily sand;
- Oily sludge;
- Used light bulbs and mercury lamps; and
- Oily rags and filters.

Non hazardous waste materials produced include:

- Solid domestic wastes;
- Pneumatic tyres;
- Metal scrap; and
- Construction waste.

Zhaikmunai have a waste management plan which was approved by the State Sanitary Department of Western Kazakhstan and is valid for 2009 (document 1.4 f). According to Article 287 of the Environmental Code of the RoK, for the purposes of transportation, recycling, storage and burial of waste three levels of hazard posed by waste have been determined based on the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal:

- Green ;
- Amber; and
- Red.

Zhaikmunai's waste management plan categorises the types of waste produced by its operations and includes details of waste management and waste disposal.

5.7.1 Waste Categories and Payment of Fees

All waste that is transported off site and stored in a landfill polygon incurs ecological fees levied by the government. Ecological fees are incurred per tonne according to the identified waste categories. These are shown in Table 14 below.

Table 14: Typical Waste Fees

Category of Waste	Type of Waste	Ecological fee (KZT per tonne)
Green	Construction waste	4,800
Amber	Drilling waste, Crude, Spent oils, Oily sand, Oily sludge, Oily rags and filters	19,200
Red	Mercury lamps	38,500
Solid Domestic waste	Solid Domestic waste	770

Zhaikmunai pay environmental fees for all waste that is transported off site by waste contractors. The cost of these fees is included in the environmental payment set out in Section 5.10 Current Environmental Expenditure.

The majority of waste produced on site is categorised as Amber waste according to the new Environmental code of the RoK. The only waste classified as Red currently produced on site are mercury lamps, which are removed by a separate waste contractor.

5.7.2 Volumes of Waste Produced

Article 296 of the Environmental Code of the RoK states that the owners of waste are required to keep waste accounting (type, quantities and origin of the waste) for a period of five years, and must submit annual reports on their activities in respect of waste management.

Zhaikmunai submits an annual waste statistical report to the Statistics Agency and MEP, for which they received approval (document 1.4 c) for 2008. The volumes of waste produced by Zhaikmunai operations in 2008 can be seen in Table 15 below.

Table 15: Annual report on Disposal of Wastes in 2008

Type of waste (tonnes)	Available at year starting	Available at Company	Delivered from other companies	Fully decontaminated / disposed by Company	Delivered to other companies for disposal	Available at Company at year ending
Solid (drilling cuttings)	8146	3,4	5654	3958	0	9837
Liquid (used drilling mud)	13367	0,9	3440	5632	0	11173
Mercury lamps (pcs)	0	700	0	0	700	0
Batteries	0	0,785	0	0	0,785	0
Used oils	0,5	0,940	0	0	1,440	0
Tyres	3,2	1,1	0	0	4,3	0
Metal scrap	1,7	1,598	0	0	3,298	0
Solid domestic wastes	0	90	0	0	90	0

5.7.3 Waste Disposal

According to Article 283 of the Environmental Code of the RoK, individuals whose activities generate industrial waste shall be deemed the owners thereof, however the title to the waste may be acquired by a Third party by means of a sale and purchase agreement, exchange contract, gift contract or another transaction alienating responsibility for the safe disposal and treatment of the waste.

The majority of wastes generated by Zhaikmunai operations are typically restricted to limited quantities of domestic waste and production waste which are collected and disposed of by a selection of certified Third party waste contractors and a collection of private enterprises. Once the waste is transported from Zhaikmunai's facilities, the responsibility for safe disposal and treatment of the waste is transferred to the contractor.

According to current Environmental Legislation, any wastes that are given to special organizations for treatment do not require permits and therefore do not have set limits for volumes of disposal.

Evidence of contractual agreements between Zhaikmunai and waste contractors were made available for review. These included:

- Mercury lamps – Contract with Municipal enterprise to accept and dispose of mercury containing equipment. Confirmation for 700 pieces with associated fees of 73,500 KZT. The agreement is valid from 05/01/2009-31/12/2009 (document 1.4 i);
- Waste Oils – Contract for the removal of waste oils with Guber Service, who removed 940 litres of waste oil between 01/12/2007 and 01/12/2008 (document 1.4 l);
- Waste metal – Contract with Gulmina and Aslan LLP, who received 3.29 tonnes of waste metal in 2008 and Zhaikmunai paid 66,784 KZT (document 1.4n); and
- Domestic waste – An agreement is in place with for 2009 with a private enterprise for the removal and disposal of domestic waste, Abay Mustafim, who will accept 1835.52 m^3 of domestic waste. Each m^3 costs 2,235 KZT and total fees will amount to 4,102,387 KZT (document 1.4 k).

According to Article 288 of the Environmental Code of the RoK, waste owners must ensure a gradual reduction of the volumes of waste throughout the entire production cycle, including through the improvement of production processes, waste recycling, and giving the waste out to individuals and legal entities who are interested in using it. In accordance with this regulation, Zhaikmunai has contracts with several private enterprises and individuals who are able to re-use and recycle operational waste.

Evidence of such contractual agreements between Zhaikmunai and waste contractors were made available for review. These included;

- Fuel/balck mazut/Waste Oils/Oil rags/used Oil filters – are kept in containers on site and then given to farmers and local companies to use. Zhaikmunai has a contract with Spetsartobasa for the removal of these wastes (document 1.4 j);
- Waste Oils – contract for the removal of waste oils by Tutaev (private enterprise/farm) who accepted 500kg of waste oil in 2008 (document 1.4 m); and
- Waste tyres – 4.3 tonnes of waste tyres were received by employee of Zhaikmunai for re-use in 2008 (document 1.4 q).

Article 293 of the Environmental Code of the RoK, states that when transferring waste to other persons for a certain period of time, the owner of the waste must complete a waste passport, which informs them in writing of the waste's hazardous properties and of handling precautions that need be taken. AMEC reviewed a document from the MEP (document 1.4 g) which is valid till 2013 and confirmed that MEP has received waste passports for all waste included in Zhaikmunai's waste management plan.

The Environmental Audit of Zhaikmunai Facilities by MEP (document 1.5h). Identified two violations in respect to waste:

- Mixing hazardous waste with domestic waste (prohibited by Article 293); and
- Burning domestic waste.

In respect to these violations penalty fines were imposed upon Zhaikmunai;

- A penalty for the legal entity (Company) - 127,300 KZT ($848)
- Two penalties on company officials, each 38,190 KZT ($254)

These practices are not in accordance with the Environmental Code of the Rok or IFC General EHS guidelines and as such AMEC recommends that suitable lidded containers be purchased for each type of hazardous waste to enable appropriate waste segregation and characterisation. The practice of burning domestic waste must also be eliminated.

There are no hazardous waste materials at the Oil Terminal and the only waste that is produced on site at present is oily sludge from WWTP. This is transferred to an isolated underground tank with a capacity of 40 m^3 (Appendix F, Photograph 13). The volume of sludge in this tank is automatically monitored by the Operations Room, however due to the small quantities of oily waste being produced it is expected to take at least three years to reach a level where it will need to be disposed of. Once this occurs it will be analysed by the laboratory to identify the

class of hazard and a suitable disposal option will be found (see Section 5.7.3.1 for further information on waste minimisation).

5.7.3.1 *Waste Minimisation*

Article 297 of the Environmental Code of the RoK states that companies should undertake measures aimed at waste recycling and reduction. To comply with the requirements of the Environmental Code, the Company are currently attempting to minimise the volume of all waste produced from their operations and improve the disposal methods in operation. For this purpose, Zhaikmunai have commissioned a study into the options available for waste management at its operations. A preliminary study called 'The Technical and Economic Justification of Complex Waste Management for Chinarevskoye Oil and Gas Condensate Reservoir' has been undertaken by Intec LLP Engineering Company (document 1.4 r). This study provides a preliminary investigation into the waste management options for Zhaikmunai and states that due to the proposed expansion of production at the Field, the amount of waste will increase and Zhaikmunai will require a more complex waste management programme for all types of waste produced, including oily wastes, domestic waste and storm water.

Some initial recommendations suggested by Intec include:

- Replacing mercury lamps with non-hazardous types of lighting equipment;
- Contaminated land; regular care and maintenance of equipment to reduce leaks and oil spills;
- Paraffin and Catholitic agent; undertake laboratory analysis before disposal;
- Oil spills; use wood cuttings on the floor to eliminate oil spills; and
- Waste given to contractors to avoid large volumes of waste storage in temporary storage facility by distributing more regularly.

5.7.4 Drilling Waste

The highest volume of waste that is created by Zhaikmunai operations is drilling waste, which includes drilling sludge and waste drilling solution. As this waste cannot be disposed of at a waste landfill (Article 302 of the Environmental Code of the RoK, the 9) it must be disposed of by Zhaikmunai.

Drilling activities give rise to significant volumes of drilling slurry, principally comprising of muds or cutting arisings from the well. Groundwater is abstracted from local groundwater via an abstraction well located at the drilling site to mix with drilling muds. This waste slurry is currently directed to hydro-isolated, plastic lined slurry pits (Appendix E, Photograph 23). The slurry pits are terminated by evaporation of the

water, folding over the plastic sheeting, laying a concrete pad and reinstating the surface with topsoil and seeding. Site management report that a 20 m deep natural layer of clay is found beneath all areas of Zhaikmunai's operations and groundwater is below 20 m of surface, which according to local regulations infers that this practice is appropriate.

Authorisation for production and storage of solid drilling waste (drill cuttings) on site was issued by MEP #0055159 (docs: 1.2 a, 1.2 b, 1.2 d) and was made available for review by Zhaikmunai. Zhaikmunai's permit is valid until 31 December 2010 and the permitted volumes for disposal of solid drilling waste were provided:

- June – December 2008 – 6,472.42 tonnes per year (total for year 9,860 tonnes-taken from permit for 2008);
- 2009 – 11,647.46 tonnes per year; and
- 2010 – 13,756.18 tonnes per year.

During 2008 Zhaikmunai did not exceed the permitted levels of solid drilling waste that was allowed to be disposed of on site (as can be seen in Table 15). Liquid drilling waste (drilling mud) is either evaporated in the hydro-isolated pit or is reused at other drilling facilities and does not require permitting.

Gidromet LLP undertakes analysis of drilling sludge and drilling solution.

For the drilling of future exploratory and production wells after 2010, another method of drilling waste disposal will be required. This is one of the main reasons why Zhaikmunai have commissioned a study into the options for waste management at its operations (document 1.4r discussed in Section 5.7.3.1). The preliminary study provides recommendations for minimisation of drilling waste, which includes a recommendation to use non-toxic drilling solutions and the use of cementing/binding chemicals to prevent migration of hazardous substances into the environment. However as this study is still in the initial stages, Intec LLP have not yet provided any viable technical solutions for the storage of drilling waste.

Unless the study by Intec provides a solution for re-use or recycling of drilling waste, site management report that there are three options at present for the disposal of drilling waste when the current permit expires at the end of 2010:

- Collection of drilling sludge into waste tanks;
- Construction of a temporary storage polygon; and
- Removal from site by a contractor.

The most likely option is to construct a temporary waste storage polygon. As such the approach to the drilling of future exploratory and production wells will require that all arisings are stored on site, dried and transported to a dedicated temporary storage polygon (appropriate and impermeable waste containment facility, usually of cement construction).

According to Article 291 of the Environmental Code of the RoK, any waste storage facilities must be determined based on the results of special studies (engineering and geological, hydrogeological and other) and when developing any facilities associated with waste handling a company must:

- Introduce low-waste technologies and organisational measures aimed at reducing the amount of waste through the use of advanced scientific and technological achievements;
- Create an inventory of waste and waste placement sites; and
- Conduct environmental monitoring at waste placement sites.

Although Zhaikmunai have a permit to dispose of sludge in hydro-isolated pits for a further two years, there is hope that the abovementioned Intec study will provide a solution that will allow recycling or re-use of drilling waste before the deadline of 31 December 2010.

5.8 Deleterious Materials

5.8.1 Polychlorinated Biphenyls (PCB)

There are 39 transformers in use at the Field which range from 40-2,500kW capacity. There are five heat transfer systems at the OTU and seven diesel generators across the facilities. All of these assets are owned and maintained by Zhaikmunai and are used exclusively for Zhaikmunai's facilities.

Waste oils from the site are transported off site and disposed of by contractors (more details are given in Section 4.9). Zhaikmunai provided a statement (document 1.4 t) to confirm that PCB are not present at any of Zhaikmunai's facilities as all electrical substations and transformers are relatively new (built in 2000) and therefore do not contain PCB. AMEC recommends that a survey of all transformer fluids is undertaken in order to develop a PCB inventory.

Maintenance of all electrical equipment undertaken by specially trained and prepared Zhaikmunai personnel according to RoK Safety Rules, Operational Regulations and Operational Code for Electrical Installations.

5.8.2 Ozone Depleting Substances (ODS)

Site visit observations confirmed that the majority of buildings across the Field were equipped with air conditioning units which were of relatively new design. These facilities have only been in operation since 1997, therefore it is deemed unlikely that

banned ozone-depleting substances exist on site, however AMEC recommends that a survey of all A/C units is undertaken in order to develop an ODS inventory.

5.8.3 Asbestos

All buildings on site appeared to be of metal/tin construction and of pre-fabricated nature. During site visits, AMEC observed no visually-obvious asbestos-containing materials (ACM). It is reported by site management that ACM do not exist across the Field.

5.8.4 Radioactive Waste

The Environmental Code of the RoK states that the maximum exposure to radioactive substances is 0.5 BER/yr and active radiation control is to be conducted at all times/stages of production. In 2006 the Ministry of Health of RoK undertook a primary investigation and testing of radioactive waste at the Field (Document 1.4 e). During this investigation it was found that the levels of radiation at Zhaikmunai facilities did not exceed the natural levels of radiation. Since 2006 no testing of radioactive waste has been undertaken, although site management confirmed that they have radiation controls in the oil pipeline.

To rectify this situation Zhaikmunai have contracted a firm, Volkovs Geologiya, to undertake a full investigation of radioactive waste at all Zhaikmunai facilities and carry out quarterly inspections

5.9 Soil, Surface and Groundwater Contamination

The Chinarevskoye Field, although subject to exploration activities since the 1960s, has only recently become subject to significant project development and productions. As such soil conditions present are generally better than may be anticipated in other operations that have been subject to more prolonged operational histories. Although no intrusive or in-depth ground investigations were carried out by AMEC, land quality appeared to be generally of a good standard across the Field.

The OTU and Oil Terminal have been constructed on virgin land with no known former contamination issues. During the site visit no observations of oil / other surface contamination was at the facilities. The facilities are well maintained and laid out. It is unlikely that significant contaminated land issues currently exist at these locations.

The abovementioned exploration wells are currently being drilled in areas of virgin land with no known previous contaminated land issues. Prior to establishment of the drilling rigs, it is standard Company practice for fertile topsoil to be removed and placed in piles external to the foot print of the drilling site. A clay bund is then constructed around the external perimeter of the drilling footprint in order to prevent potential spills or well blow-outs from migrating off-site. On completion of drilling activities, the clay bund is reduced to a smaller area in order to house the production well equipment. On inspection of Production Wells No. 56 and 51 (Appendix E, Photograph 3 and 4) no visual surface signs of contamination were observed. No significant land quality issues associated with production wells are considered to exist.

Furthermore, site management report that there is no known significant contamination to surface or sub-surface soil horizons and there is therefore no contaminated land register or spill register. Soil monitoring is undertaken on an annual basis by the Laboratory of the Sanitary and Epidemiological Expertise of Western Kazakhstan and over the period 2001-2008 the Company did not exceed permitted levels of operational control (further details are provided in Section 3.3.1.2). The annual soil monitoring programme is outlined in Zhaikmunai's Programme of Production Environmental Control. A programme for the period 2008-2010 has been established in which the Company have outlined the soil monitoring programme to be undertaken for 2009-2010 (document 1.6h).

AMEC recommend that the Company maintains an up-to-date spill/incident register documenting locations, nature and volumes of product released, reasons for the release/spillage and actions taken to remediate the spill.

5.9.1 Rehabilitation Practices

Certain requirements for the rehabilitation and recultivation of operational areas are outlined in Articles 217 and 220 of the Environmental Code of the RoK. In relation to nature use and subsoil use, companies must:

- Maintain occupied land plots in the condition suitable for their further intended use;
- During operations that might cause land disturbance and construction of subsoil use structures on fertile and agricultural lands, fertile soil shall be moved and stored separately for further reclamation of the area; and
- Upon completion of nature use and subsoil use operations, land reclamation shall be performed in accordance with project solutions.

When selecting a method of land reclamation, the following shall be taken into account:

- The nature of surface disturbance within the land plot;
- Natural and physical-geographical conditions in the area where the site is located;
- Social and economic peculiarities of site location, taking into account the prospects for the area development and environment protection requirements;
- A necessity to recover the main area of the disturbed land to use it as cropland within the black earth and intensive agricultural production areas;
- Mandatory planting of greenery within the area.

The regulatory agencies with which Zhaikmunai deals with in relation to land contamination and rehabilitation are the Agency of the RoK on Land Resources, the State Scientific Production Centre of Land Resources and Land Management, the Department of West Kazakhstan Oblast State Technical Inspection and the Ministry of Emergency Response Department of West Kazakhstan.

To comply with these regulations and those established by the subsoil use permits, Zhaikmunai have adopted a standard working project for the rehabilitation and recultivation of operational areas, which has been approved by MEP (doc: 1.1.a and 1.1 b). As part of this project a number of measures are undertaken to ensure that disturbance to the natural environment is minimised during operational activities and to ensure that it is rehabilitated to its natural state after operational activities have ceased.

5.9.1.1 *Operational wells*

At drilling and production wells, the upper 50 cm of top soil is removed for the drill pad, the 3.09 ha area associated with drilling activities (Appendix E, Photograph 3). The top soil is stock piled at the drill site and is re-instated along with seeding, following the completion of drilling and decommissioning of the well or installation of a production well head.

AMEC viewed exploratory well drilling sites under operation and following re-instatement and in the surface conditions appeared to be good and the clearance of top soil (and storage for re-instatement) in line with MEP-approved operating practices was observed.

As part of the rehabilitation plan, soil samples are taken from the area surrounding rehabilitated wells to ensure the area has been restored to its natural levels. Zhaikmunai provided several examples of monitoring undertaken to investigate the environmental impact assessment of drilling works:

- Analysis was undertaken by a company called Oral Zhek LLP (document 1.6e) in 2008. They inspected Wells No. 20 and 56. Within 50 cm of soil sampling areas there were no exceedances of permissible levels of concentrations of toxic metals/oils. Very low concentrations of nitrogen contamination were identified, for which the Company was recommended to store materials used during drilling in separate a waste polygon and re-cultivate the land after drilling; and
- Analysis was undertaken by Gidromet LLP (document 1.1 C) in 2008. The results of this analysis concluded that there were no exceedances of the permitted levels of toxic metals/oils in rehabilitated soils.

Although the results of land quality analysis undertaken around historical hydro-isolated pits containing drilling waste have shown no exceedances of permissible levels of environmental contamination, AMEC considers that the practice of storing drilling waste in hydro-isolated pits on site should cease, which has been discussed further in Section 5.7.4.

5.9.1.2 *Conserved and Historical wells*

According to Article 220 of the Environmental Code of the RoK, any wells are required to be closed-down or abandoned in accordance with the procedure established by the legislation of the Republic of Kazakhstan subsoil and subsoil use.

There are six abandoned wells at the Field, which have been decommissioned by the Company. The Department of West Kazakhstan Oblast State Technical Inspection and the Uralsk Military undertook inspections of the decommissioned wells and approved the decommissioning works (doc: 1.1.e-i).

During the AMEC site visit, decommissioned well No. 2 (Appendix E. Photograph10) was inspected and observed to be decommissioned as set out within the approved documentation pursuant to the laws of the RoK. No visual evidence of surface contamination was evident in the immediate area.

There are four conserved wells at the Field. During the site visit, conserved well no 24 was inspected and as per the guidelines in the rehabilitation plan, the top 50 cm of top soil had been removed and stored in piles around the perimeter of the well (Appendix E, Photograph 18).

5.9.1.3 *Operational Facilities*

It was also noted during the site visit, that according to Zhaikmunai's rehabilitation plan, 50 cm of topsoil has been removed from all operational areas of the Field,

including the OTU and the Oil Terminal (Appendix E, Photograph 19). The topsoil is stock piled around the perimeter of each facility and will be used to re-cultivate the land once the facility has been decommissioned.

5.9.2 Rehabilitation of leased land

5.9.2.1 *Input Flow Lines and Wells*

Zhaikmunai's subsoil license from the government of the RoK does not include permits for operations on the surface of land; therefore Zhaikmunai must lease this land from local land owners and farmers. The majority of land in the Field is leased from local land owners, apart from the OTU which is owned by Zhaikmunai.

Before leased land is returned to its owners, the rehabilitation of the land is required to be approved by a committee of land owners. Zhaikmunai provided an example of this approval (document 1.1d) in 2009, for rehabilitated areas associated with internal oil flow pipelines and wells. The committee members approval board consisted of:

- Akim of Yanvartsevskiy District;
- The Director of the Technical University of Western Kazakhstan;
- Land Owners;
- Zhangaliev and Mukashav; and
- Representatives of Zhaikmunai and Zhaikkurylys (construction company).

The total area of land that has been rehabilitated in accordance with Zhaikmunai's standard working project for the rehabilitation and recultivation of operational areas and returned to its owners was 190.52ha. The committee stated that the rehabilitation of lands destroyed during the construction of the internal pipeline and wells was done according to the requirements of the legislation of Kazakhstan and are therefore subsequently suitable for agricultural use.

5.9.2.2 *Oil Pipeline*

Zhaikmunai have received approval of the Environmental Impact Assessment (EIA) of the 120 km oil pipeline from MEP (document 1.5 i). An area of reinstatement and rehabilitation along the 120 km oil pipeline was observed by AMEC during the site visits and appeared to be well re-instated (Appendix E, Photograph 11). It should be borne in mind however that the pipeline has only just been commissioned and therefore the state of recultivation is still in the initial stages. Zhaikmunai reported that they were still awaiting a final regulatory inspection and approval of the infrastructure and recultivation of the oil pipeline. From the limited observations possible during the site visited AMEC saw no obvious indications why regulated approval should be withheld.

The land along the oil pipeline has been leased from local landowners. There are currently 34 agreements with land owners along the length of the pipeline, which are valid until June 2009. Zhaikmunai provided an example 3 year lease agreement in which the total area is 19.2ha and length 8,660m and the total annual payment to compensate losses of farmer 554,470 Tenge (document 1.8 o). After this 3 year lease Zhaikmunai planned to lease this land on a long term lease from the government, however there is currently a conflict with the local land owners over this issue which has yet to be resolved.

5.9.3 Exit Strategy and Insurance

In accordance with requirements of the PSA and international standards, Zhaikmunai annually accrues capital to a dedicated exit strategy (or Abandonment fund) with a projected total value to the order $12 million. Zhaikmunai are required to fund a dedicated account managed by a contractor with $100,000 per year during the exploration phase and $451,000 during the production phase of the Field (Document 1.9 d and 1.9 e). A specific strategy and exit plan is not yet developed, however this is not a current regulatory requirement due to the substantial projected remaining asset life.

5.9.3.1 *Ecological Insurance*

All individuals and legal entities engaged in activities with potential to cause harm to the environment are subject to obligatory ecological insurance according to the law of the RoK. This insurance is used as a mechanism of economic regulation concerning environmental protection and natural resources management (Article 95 of the Environmental Code of the RoK).

Zhaikmunai maintains a compulsory Ecological insurance policy (includes personnel, fire insurance and Third party liability). The certificate of insurance for the period 1 January 2009 – 31 December 2009 (doc: 1.9 f) was made available for review by the Company. According to the insurance certificate reviewed, the maximum amount of responsibility of Insurer per insurance claim is KZT 127.98 million. Zhaikmunai also maintains an Employee insurance policy (document 1.9 g) for the period 1 January 2009 – to 31 December 2009. According to the insurance certificate reviewed, the maximum amount of responsibility of Insurer per insurance claim is KZT 618.69 million.

5.10 Current Environmental Expenditure

In accordance with the Subsoil Use Permits and RoK law, the Company is required to make annual payments to the state for use of the sub-soil. In accordance with their Nature Use permits, the Company is required to make payments based on the number of specific substances emitted to the atmosphere.

The company provided details of the actual payments for 2008 and the forecast payments for 2009 (document 1.9 b) which can be seen in Table 16 below.

Table 16: Environmental Payments

Fees paid for sub-soil use and nature use (USD$)		
	Actual 2008	**Forecast 2009**
Royalties (Sub-soil use)	5,986,203	4,207,962
Nature protection programme	2,917,036	3,509,936

It is reasonable to assume that royalties and environmental payments on a similar scale will continue in future years of operation and that the level of such payments will increase broadly in proportion with increased operations and production as the Field is developed. The only environmental payments which are set to decrease in 2010 are those relating to the flaring of associated gas, which will be eliminated with the introduction of the GTP.

5.10.1 Penalties

Since 2006, the Company has not paid any penalties for environmental issues.

5.10.2 Environmental Plan

Company forecasted budgets for environmental expenditure (document 1.9 a) were made available for review and appear to be adequate and realistic in relation to the scope of activities anticipated and allocated Capex. The Environmental Plan for 2009 is presented in Table 17 below.

Table 17: Environmental Payments Forecast 2009

Action	*Anticipated Capex(USD$)*
Report for monitoring of subsurface resources	50,000
Ecological payments for emissions	3,509,936
Land recultivation	514,050
Air, planting media and water analysis	20,000
Purchase of Work wear and protection means	372,847
Ecological Insurance	9,125
Project of industrial discharge injection (water re-injection)	65,000
Industrial Safety Project	42,000

5.11 Conclusions and Recommendations

5.11.1 Summary of Regulatory Compliance Status

The performance of the Company is, for the most part, in compliance with national and international regulations and standards associated with onshore oil and gas production. Only minor areas of non-compliance associated with hazardous materials storage, hazardous waste storage, radioactive waste testing and secure fencing were identified. These areas of non-compliance are of a basic nature and will not require complex mitigation.

Whilst the history of exploration of the Field dates back to the 1960s, all known historical wells have been de-commissioned and recultivated in accordance with RoK environmental requirements. The subsequent operational history of the Field has been short and of a limited extent, as such no significant legacy issues or existing contamination was identified during the assessment.

Some potential regulatory liabilities were identified associated with current operational practices in relation to environmental legislation in Kazkahstan and International Standards and best practices;

There have been no investigations or testing of radioactive waste at Zhaikmunai facilities since a primary investigation was undertaken in 2006 by the Ministry of Health of RoK. To rectify this situation Zhaikmunai have contracted a firm, Volkovs Geologiya, to undertake a full investigation of radioactive waste at all Zhaikmunai facilities and carry out quarterly inspections throughout 2009.

During the MEP inspection in 2009, two violations were sited for the mixing of hazardous waste with domestic waste and the burning of domestic waste. These practices are not in accordance with the Environmental Code of the Rok or IFC General EHS guidelines and as such AMEC recommends that dedicated storage

containers be purchased for each type of hazardous waste (in accordance with IFC guidelines) and the practice of burning of domestic waste be eliminated.

Several operational facilities, namely exploratory wells and the temporary Field camp, were identified as lacking a secure perimeter border. To ensure that Zhaikmunai's facilities comply with the IFC EHS Guidelines – Onshore Oil and Gas Development, AMEC recommends that all operational facilities at the Chinarevskoye Field be contained using secure perimeter fencing to prevent harm to any persons or animals that come across facilities and to prevent accidental damage to facilities.

Another potential regulatory issue was identified associated with the storage of chemicals in the cold storage warehouse at the OTU. It was noted that there are no drains within the storage warehouses, no spill kits and no secondary containment in the case of a spill. Any chemical spill inside the storage warehouse could migrate off the concrete floor to the soil outside the storage warehouse. To ensure that Zhaikmunai facilities comply with requirements set out by EU BREF, AMEC recommends that a robust method of secondary containment, such as a 6-12" concrete lip/bund be installed to the floor around the warehouse perimeter or inside the warehouse as an obligatory measure to protect against any spills or leaks.

Oxygen canisters are stored at various locations across Zhaikmunai facilities in lockable raised metal containers. It was noted on the site inspection that several of these containers did not appear to be lockable and the doors were merely tied together. AMEC recommend that lockable containers be purchased or old containers be mended to facilitate this requirement.

It was also noted during the site inspection that a large quantity of the demulsifying agent, used for the Demercaptanization Plant, was left out in the open. Practices such as this are not in accordance with IFC General EHS guidelines and AMEC recommend that such materials should be moved into one of the cold storage areas, or if there is not sufficient capacity, then a new storage area should be constructed.

Domestic waste at Zhaikmunai facilities is stored in open metallic containers, however such practices are not in accordance with IFC General EHS guidelines, which require waste to be stored in secure and covered areas and AMEC therefore recommends that adequate storage containers be purchased for domestic waste at all facilities.

Although site management reported that no PCB's are present on site AMEC recommends that a survey of all transformer fluids is undertaken in order to develop a PCB inventory.

Furthermore AMEC recommends that a survey of all A/C units is undertaken in order to develop an ODS inventory.

5.11.2 Other Environmental Management Issues

Due to the inherent nature of the Zhaikmunai's operations, it is likely that minor spills will occur and at present Zhaikmunai does not maintain a spill register. AMEC recommends that the Company maintains an up-to-date spill/incident register documenting locations, nature and volumes of product released, reasons for the release/spillage and actions taken to remediate the spill.

5.11.2.1 *Involuntary Resettlement of Rozhkovo Village*

The Village of Rozhkovo is located within the Sanitary Protection Zone (SPZ) of the Chinarevskoye field within 1-2 km of nearby wells and facilities. On 18 April 2006 Zhaikmunai received a statement from the Western Kazakhstan Akimat (Statement number 2986, Document 1.8 g) detailing that a decision had been made to relocate the population of Rozhkovo village and resettle the population elsewhere. On 13 November 2006 the Sanitary Department of the Ministry of Health issued a statement (Document 1.8h), that although there were no exceedances of harmful substances found near Rozhkovo village, because it is within the SPZ of the Chinarevskoye field and in close vicinity to operational activities it must be resettled.

After these notifications Zhaikmunai began a public consultation process with the population of Rozhkovo village involving a number of public hearings. These were held on the 18 July, 19 July and the 25 July 2006 in Rozhkovo village (Document 1.8 j-l). They were attended by a resettlement committee which includes; the deputy mayor of the region, the head of the land use department of the region, an independent chief legal specialist, Zhaikmunai EHS department deputy head. the Head of the Sanitary and Epidemiological Department of Western Kazakhstan, the advisor of the general director of Zhaikmunai, the head of the social/administration department of Zhaikmunai and an environmental specialist from Zhaikmunai. During this public consultation process the population of Rozhkovo village were given 3 options for resettlement and relocation:

- Resettle the village outside the SPZ;
- Resettle the population in alternative housing in local villages outside the SPZ;
- Resettle the population in alternative housing near Uralsk; or
- Receive financial compensation for their properties in Rozhkovo.

In the public hearing on the 25 July 2006 a large majority of the population opted for inclusion in the provision of alternative housing outside the city of Uralsk. A small proportion chose to receive financial compensation for their properties instead of resettlement.

On the 18 April 2007 Zhaikmunai received a permit from the Oblast Department of Justice for the relocation of Rozhkovo village (Document 1.8 i). The obligations of Zhaikmunai as a result of this permit for the relocation of the population of Rozhkovo include the allocation of compensation for properties, or the provision of suitable alternative housing of not less than 15 m^3 per person.

Zhaikmunai developed a design project to build apartment blocks with 90 apartments for approximately 300 residents in Zachagansk village near Uralsk. This was contracted to a construction company called Otdelstroy LLP and construction was started in May 2008. The cost of this apartment block is 530 million KZT, it has 24 one-bed apartments, 24 two-bed apartments, 30 three-bed apartments and 12 four bed apartments. Zhaikmunai reported that this will be completed by the end of April 2009. (Document 1.8 m).

Zhaikmunai are now waiting for approval from the local authorities that the apartment block is ready for habitation. Once this has been approved it will become the property of the local municipal authority. The legal rights of the resettled population will be ensured by an agreement of exchange which will ensure that they become the owners of their apartments and will give Zhaikmunai the ownership rights of their old properties.

An independent legal advisor is working with the population of Rozhkovo village to ensure they are fully aware of their legal rights. The legal advisor is part of resettlement committee and was present at all of the public hearings. The population to be resettled also have free access to Zhaikmunai's own lawyers.

The involuntary resettlement of Rozhkovo village is still in the initial stages of development and Zhaikmunai is currently co-ordinating a Resettlement Action Plan (RAP) with a local environmental consultancy called Caspi-Ecology, who are working with a Social Specialist from EBRD. The RAP will be developed in accordance with international guidelines and it will then be approved by the local authorities. The resettlement plan will include a grievance procedure and will involve stakeholder engagement involving feedback from the population of Rozhkovo, the local authorities and legal advisors. Further details of the resettlement will be provided in the RAP.

According to preliminary figures collected by Zhaikmunai approximately 300 people from the village of Rozhkovo have chosen to relocate to the apartment blocks in Zachagansk village near Uralsk. Approximately 20 people from the village of Rozhkovo chose to receive financial compensation for their properties instead of resettlement. The figure provided to AMEC for financial compensation that has been provided instead of resettlement is currently $722,361.00 (USD). According to Zhaikmunai the financial compensation for the property in the villages was of

significantly higher value than the actual current value of the properties and the standards of the accommodation provided in the apartment block in Zachagansk village are also significantly higher than the standards of accommodation in Rozhkovo.

Zhaikmunai have allocated a total cost of 6million US$ for the resettlement of this village.

5.11.2.2 *Stakeholder Engagement Plan*

As part of the stakeholder engagement plan for Zhaikmunai's operations, public hearings are held in local communities for all of Zhaikmunai's new projects. AMEC were shown documents (Document no 1.8 a-f) containing minutes of public hearings held in Dariynsk and Beles Villages for the following projects:

- Exploitation of gas condensate (12th December 2008);
- Technological Scheme of use of Oil Resources (12th December 2008);
- Construction of the Oil Terminal (11th December 2006 & 05th December 2006); and
- Construction of Exploration wells (30th October 2008).

Details of new projects being undertaken by Zhaikmunai are advertised in the mass media and details of the public hearings relating to these new projects are also are advertised in the mass media. AMEC were showed an example of these advertisements in Panorama Newspaper on 26th March 2009 (Document 1.8 n) for the preparation of technical documents for the construction of operating wells.

AMEC recommends that a stakeholder engagement plan be prepared for all planned expansions. This will include details of the following:

- Planned media advertising for all new projects;
- Planned public hearings for all new projects, including planned locations and attendees; and
- Details of a grievance procedure for the public, which will allow identification of objections or complaints about the project.

6 HEALTH AND SAFETY PERFORMANCE

6.1 Local/National regulatory requirements

6.2 Health and Safety Legislation

The main law governing labour rights within Kazakhstan is the RoK Labour Law 1999, which came into force on the 1 January 2000. This law forms the backbone for regulations and conditions specific to employee health and safety in Kazakhstan.

More specifically, the RoK, Ministry of Oil and Gas Industry and the Ministry of Geology and Mineral Wealth Protection has produced "Safety Rules in the Oil and Gas Industry of the Republic of Kazakhstan (1996)". These Regulations have been developed by the State Enterprise "Main Oil-Gas Inspection" along with opinions from oil and gas industry leading specialists in geological exploration and scientific-research institutes. The safety rules are specific to operational activities undertaken within the oil and gas industry and were used as an audit tool during the health and safety assessment in order to confirm the company's general compliance with specific documentation relating to the oil and gas industry.

Oil and gas operations within Kazakhstan are governed by MERD with respect to industry specific health and safety requirements. Other regulatory authorities with which Zhaikmunai deals with in respect to health and safety are the Sanitary and Epidemiological departments of West Kazakhstan and MEP.

The Main Oil and Gas Inspection Regulations 1996, set out mandatory standards that such operations should adhere to through approved documentation. These mandatory standards are presented with Appendix O. As part of the health and safety assessment, AMEC requested that Zhaikmunai provide evidence that these documents were present and authorised by the appropriate regulatory bodies.

6.3 Applicable EU/World Bank/Other requirements and standards

International Environmental Health and Safety Standards which were referenced as part of this heath and safety audit have been discussed in Section 5.1.2.

6.4 Key Health and Safety Issues

6.4.1 EHS Organisation

Zhaikmunai's EHS organisation is detailed in Section 4.2. The company is not currently accredited to any safety management systems, but the HSE director informed AMEC that they plan to obtain accreditation in the next few years.

6.4.1.1 *Health Provisions and Procedures*

In accordance with national sanitary regulations, both the OTU and the Oil Terminal have a first aid station and two qualified medical staff who operate on a shift basis to ensure that there is always someone on duty. Each day before work activities commence all personnel have a brief medical examination on site to ensure that they are fit to perform their activities and all drivers are obliged to undergo an alcohol test. Each facility has an ambulance or a duty car that can be used in case of an emergency. The medical facilities at each site only provide basic first aid but the nearest licensed medical facility to the OTU are located in the village of Daryinsk, which is located 62 km from the OTU. The nearest medical facilities to the Oil Terminal are located in the village of Beles, which is located 2 km from the Oil Terminal

There is an EHS office at both the OTU and the Oil Terminal and an EHS engineer is constantly on duty. Although the drilling rigs at the Field are operated by SAIPEM, they are required to have the same first aid provisions as the Zhaikmunai facilities. There is a first aid point with a licensed medical staff constantly on duty. There is an ambulance constantly located on site and a there is always one EHS supervisor on duty on a 24-hours basis (Appendix E, Photograph 33). Health and safety inspections at the drilling rig are conducted by SAIPEM and Zhaikmunai.

All Zhaikmunai staff are required to undertake a pre-employment, annual and termination medical examination. Zhaikmunai provided details of the annual medical examination of Field staff for 2008 (document HS23). This was undertaken for 211 people including three women and was completed by representatives from a local medical organisation and the Sanitary and Epidemiological Department of Western Kazakhstan.

Potable water is supplied by a local contractor who transports drinking water from Uralsk in plastic containers. All facilities on site have running hot and cold water and showering and washing facilities, where required, in accordance with national sanitary regulations.

6.4.1.2 *Safety Provisions and Procedures*

Zhaikmunai have two safety declarations, one for production facilities at the OTU (document HS2) and the other for the Oil Pipeline (document HS3). These have both been co-ordinated and approved by MERD. Zhaikmunai also have a comprehensive set of site safety instructions and procedures which have all been approved by MERD:

- Health and Safety Instructions Part 1 (General/ Drilling Crews) (document HS9); Includes 74 safety instructions no.01-74 for different work activities i.e. drilling, emergencies, maintenance and use of cranes and work with acids;
- Health and Safety Instructions Part 2 (work camp at OTP, transport and Substation) (document HS10); Includes safety instructions no. 200-246 for camp activities i.e. primary induction, safety induction, kitchen personnel, safety for workers in storage facilities, welders HandS, HandS electricians, drivers and operator of petrol station;
- Health and Safety Instructions Part 3 (Oil Treatment plant) (document HS11); Includes safety instructions no. 300-332 for OTP; including fire safety, accumulators, working with chemicals, first aid, control and measuring devices and flaring equipment;
- Health and Safety Instructions Part 4 (Laboratory) (document HS12); Includes no. 401-415 safety instructions, including; thermostat use, poisonous chemical substances and hydrogen generator; and
- Health and Safety instructions Part 5 (Oil Terminal) (document HS 13); Includes safety instructions no.500-545 i.e. working with tanks and treatment facilities, maintenance of electrical devices and loading mechanisms.

Zhaikmunai have a Permit to Work system, including risk assessments, which are undertaken for each activity and provide full work instructions. Zhaikmunai provided several examples of risk assessments undertaken which included working at height and working with flammable substances (HS26). Before any work activity can be started these forms are required to be completed and signed by the person carrying out the works, an EHS supervisor and a fire inspector. Zhaikmunai also have approval from MERD for all hazardous activities undertaken at their facilities (document HS20).

PPE is provided to all Zhaikmunai employees and contractors provide their own staff with PPE which is regularly inspected by Zhaikmunai. A dedicated PPE storage area is located at the OTU and the wearing of PPE is mandatory for all staff working at hazardous facilities. All areas which require specific PPE such as breathing apparatus are clearly marked with PPE signs at the entrance to the facility (Appendix E, Photograph 31). During the site visit AMEC noted that all staff appeared to be wearing appropriate PPE for the work being undertaken.

6.4.2 Safety Record

Zhaikmunai site management report that there have been no accidents or incidents within the last five years. Although Zhaikmunai do maintain a record of accidents/incidents and lost time per 100,000 hours worked, they do not currently record all near misses.

AMEC recommend that a full registers of all near misses is maintained by Zhaikmunai along with the record of accidents/incidents.

6.4.3 Noise, Vibration, Lighting and Other Physical Factors

Employee exposure monitoring and inspections of work places for health and safety compliance is undertaken on an annual basis by a contractor. Zhaikmunai provided details of surveys completed in 2007 and 2008:

- 2007 (document HS16) – Health Training Centre LLP surveyed all workplaces for compliance with sanitary regulations and monitoring at each workplace was undertaken for light, vibrations, noise, air quality, PPE and potential trauma. The survey concluded that all work places were in compliance with local Health and Safety regulations and there was only one exceedance of permitted levels of electromagnetic radiation which was due to old computer monitors which have now all been replaced;
- 2008 (document 1.6 b) – The Sanitary and Epidemiological Department of Western Kazakhstan (Valid till 31.12.2010) undertook analysis of air, ground, surface waters and soils in the working zones of the production facilities of Zhaikmunai including monitoring microclimate, light, vibrations, air quality, noise, hazardous substances, PPE and electromagnetic and electrostatic measuring. There were no exceedances of permitted levels set by sanitary regulations.

Zhaikmunai also have in place a Programme of Sanitary and Hygienic Monitoring for 2009 (document HS 17 and Appendix Q) which outlines the planned employee exposure monitoring and inspections of work places for health and safety for 2009 and has been approved by the Sanitary and Epidemiological Department of Western Kazakhstan.

No noise complaints have been received from employees or neighbours. All required PPE is provided by Zhaikmunai.

6.4.4 Site Safety Provisions

During the site inspection it appeared that all areas were adequately provisioned with site safety equipment and all area's requiring PPE are adequately signed.

6.4.5 Fire Protection

Zhaikmunai has state accreditation for the OTU (State Commission Acceptance Act (SCAA)). This is signed by all governmental authorities (including HSE) after the asset becomes operational (document 1.5 t) and certifies that all buildings at the OTU are in compliance with local building codes and local fire department regulations.

Zhaikmunai are still awaiting full state accreditation for the oil pipeline and Oil Terminal facilities. The State Commission should take place at the beginning of May 2009.

For further details on training and emergency response units for fire protection see Section 4.2.2.

6.4.6 Hazardous Materials/Waste Handling

Training is provided to all staff involved in handling hazardous materials and waste. AMEC were provided with details of training conducted for personnel who work at materials storage and hazardous storage area for personnel working at the Field (document HS53). Zhaikmunai also reported that regular spill response drills are conducted at both the OTU and Oil Terminal.

Zhaikmunai do not have a written procedure for hazardous material and hazardous waste storage and handling, but procedures for these activities are included as safety instructions as part of the health and safety instructions for each facility (HS9 - HS13). These include instructions for handling of each type of chemical in use at Zhaikmunai facilities.

6.4.7 Temperature Exposure

The climatic conditions at the Zhaikmunai operating sites include a range of temperatures from -13 to 20 ºC (as can be seen in Section 3.1). All site personnel are

equipped with appropriate PPE for adverse weather conditions. This includes padded and protected trousers and jackets, safety boots, hats, helmets and gloves.

6.4.8 Radiation Exposure

A primary investigation and testing of radioactive waste at the Field was undertaken in 2006 (Document 1.4 d). During this investigation it was found that the levels of radiation at Zhaikmunai facilities did not exceed the natural levels of radiation. No surveys have been undertaken to monitor radiation exposure of employees at Zhaikmunai facilities.

AMEC considers that a survey of radiation exposure in relation to personnel should be undertaken.

6.5 Conclusions and Recommendations: Health and Safety

6.5.1 Summary of Regulatory Compliance status

The health and safety permit status of Zhaikmunai was found to be compliant with the current activities undertaken as governed by Kazakh legislation specific to the oil and gas industry.

As part of the health and safety assessment, AMEC requested that Zhaikmunai provide evidence that they complied with the Oil and Gas Inspection Regulations 1996. Zhaikmunai provided the full compliment of documentation upon request highlighting regulatory compliance with health and safety protocols within the Kazakhstan oil and gas industry. A list of the documents presented to AMEC is listed in Appendix O.

The site inspections indicated a good standard of health and safety awareness and conduct in compliance with Kazakh operating standards.

AMEC found the operational activities to be undertaken to a high standard in comparison to similar activities and geographies. One obligatory requirement was identified which is associated with the requirement to undertake a survey of radiation exposure of personnel. This can be addressed during the radioactive waste survey which has already been scheduled for 2009 by Zhaikmunai.

6.5.2 Health and Safety Improvements

No incidents or accidents have occurred since the initiation of the OTU at Zhaikmunai facilities; however it is recommended that a record of all near misses is maintained to be used to improve health and safety at Zhaikmunai facilities and to prevent any future incidents or accidents.

The OTU has state approval with respect to current regulatory requirements, however state approval for the Oil Terminal and oil pipeline were still outstanding.

7 OTHER LABOUR ISSUES

As of 10 April 2009, the number of personnel employed by Zhaikmunai has evolved as follows:

- 435 in 2007;
- 546 in 2008; and
- 592 by the end of 10 April 2009.

As of 10 April 2009 Zhaikmunai's workforce comprised of 576 Kazakhstan citizens and 16 expatriates. There are 473 male employees and 77 female employees, ranging in age from 22-50 years.

A dedicated Human Resources (HR) team of two personnel exists in the head office of Zhaikmunai in Uralsk, to manage labour and working conditions. The HR team has developed and implemented some procedures for ensuring appropriate personnel management.

7.1 Human Resources Policies and Procedures

The Company are committed to preventing discrimination, identifying discrimination cases, and if the situation exists, to take appropriate measures against any form of discrimination in its relations with employees and partners. However Zhaikmunai do not have a written procedure for non-discrimination and equal opportunities, but instead are guided by the national constitution where discrimination is not tolerated.

Working over-time is not practiced at any of Zhaikmunai's facilities, therefore the Company do not have a written procedure for managing over-time.

The Company has an internal management document for wage control.

The Company does not have a written grievance procedure for employees, however employees are encouraged to discuss issues with their supervisors and if they have a serious grievance can write to the General Director who will forward it to the relevant department to ensure the grievance is dealt with appropriately.

AMEC recommends that for the company to be in line with EBRDs policies a written grievance procedure and a non discrimination procedure must be developed.

7.2 Working Relationships

All employees are provided with written information regarding the terms and conditions of their employment, in the form of an Individual Labour Agreement (ILA). The ILA outlines terms and conditions, such as notice periods of individual's employment in accordance with national labour legislation. The ILA (Document 2.4. a), agreed between Zhaikmunai and their employees, regulates various aspects of employee and employer obligations for employment, including:

- Working hours and leave;
- Payment and bonuses;
- Rights and responsibilities of the employee;
- Rights and responsibilities of the employer;
- Working schedule and disciplinary actions; and
- General provisions of Health, Safety and Environment.

7.3 Management of Worker Relationships

7.3.1 Working Conditions and Terms of Employment

Zhaikmunai employs both national and expatriate workers. Employees are recruited via agencies, personal contacts and direct contact. Zhaikmunai have an online data base where prospective candidates can upload their CVs.

7.3.2 Workers' Organisations

There is no specific trade union or workers organisation for Zhaikmunai employees, however employees are free to form, or join workers' organisations of their choosing. The employees' rights to join a workers union have been respected; however there have been no movements to join a union to date and these rights are not guaranteed. Employees are also free to meet, converse and negotiate conditions of the work environment, including pay levels, with their employer.

7.3.3 Wages, Benefits and Conditions of Work

The ILA documents various general terms and conditions regarding employment at Zhaikmunai (see Section 7.2). It also details the benefits given to all Zhaikmunai employees:

- An extra days leave for three years continuous employment with Zhaikmunai;
- Two extra days leave for five years continuous employment with Zhaikmunai;

- Three extra days leave for ten years continuous employment with Zhaikmunai;
- Three extra days leave for marriage;
- One year of financial support for education for employee's children;
- Sponsor of credit for employees;
- Financial bonus for good performance;
- Financial support for work-related education for employees;
- Financial bonuses for birthdays (50, 55, 60, and 45 for women); and
- On leaving company after five years receive an extra months salary.

7.4 Forced Labour

Zhaikmunai does not employ forced labour and all employees are free to leave the premises and resign from their employment at any time without repercussions. Zhaikmunai also report that none of their suppliers or contractors employ forced labour.

7.5 Child Labour

In accordance with national legal requirements, Zhaikmunai does not employ persons under the age of 18 years. The age of all employees is recorded and verified through individual's Personal Identification at the start of employment with Zhaikmunai. Zhaikmunai also report that none of their suppliers or contractors employ child labour.

8 ANALYSIS OF PROPOSED EXPANSIONS

8.1 Soils, Geology and Hydro-geology

8.1.1 Impacts

8.1.1.1 *Oil Treatment Unit (OTU) Extension, Installation of GTP and LPG Terminal and Water Re-injection Plant*

The primary impacts associated with extension of the OTU and installation of the GTP and LPG Terminal will be compaction of soil in the localised areas immediately surrounding these facilities. This will be as a result of operation and movement of heavy construction vehicles over the ground.

It is also possible that soil erosion may occur during the construction and operational phase if reinstatement of soil is not completed correctly. This can affect landowners and farmers by decreasing the quality of fertile agricultural land.

In addition, as construction activities will necessitate the presence of heavy vehicles, it is likely that large volumes of hazardous materials, such as fuels, oils and lubricants will be required to be transferred for re-fuelling activities and also stored temporarily, therefore increasing the potential for spillages and ground contamination.

Construction of these facilities will likely require some soil excavation to be carried out in order to install new foundations for equipment. It is unlikely that these excavations will affect the water table as groundwater is located approximately 20 m below the ground surface.

In all locations of new infrastructure, the quality of soil and groundwater should be obtained prior to commencement of construction activities so as to provide a baseline measure against which future soil and groundwater quality can be measured.

8.1.1.2 *Gas Pipeline*

Ground contamination is not known to be present by Zhaikmunai in the area to crossed by the proposed pipeline. The main adverse impacts of the pipeline will be during the construction phase when trenching will be carried out and heavy equipment used for pipe-lay activities. Main impacts will be loss of top and subsoil horizons, compaction of soil along the running track and potential collapse of trench walls resulting in injury to workers.

The project will have no direct impacts on the local topography, as the pipeline will be buried and the site restored once installation is complete.

Small teams of personnel may be required to carry out maintenance activities along the pipeline during the operational phase. Provided that basic house-keeping activities are implemented as part of the activities, there will not be any significant impacts on local geology and soil quality during the operational phase.

As the pipeline is to be buried and will have a minimum cover depth above the pipe of 0.8 m within open fields, there will be no permanent loss of agricultural land. It is prohibited to perform any jobs in the protection zone of the Gas Pipeline without prior notice and approval from the Gas Pipeline owner. Agricultural works can be performed with prior notice of the commencement date.

During construction and for a short period during which re-instatement works will be carried out, the working width will be disturbed resulting in the temporary loss of land-use in the pipeline area. The Gas Pipeline buffer zone is 50 m wide and the total agricultural land take for construction will be 75 ha.

As the construction season will last for approximately six months, all cropping (spring or autumn sown) and grazing use, will be lost for those six months within the working width. The land loss in any one area will not represent a significant proportion of any viable agricultural unit but overall revenue from crops, for the 2009 - 2010 seasons, will be reduced at each affected holding. These impacts should only be short term in nature and of low magnitude due to the reinstatement works that will follow in addition to compensation arrangements.

8.1.2 Mitigation

8.1.2.1 *Oil Treatment Unit (OTU) Extension and Installation of GTP, LPG and Water Re-injection Plant*

In order to mitigate against soil compaction from operation and movement of heavy vehicles during construction of these facilities, top soil will be removed and stock-piled for re-use and a series of dedicated road ways will be used. Roadways will be clearly marked. Where possible, vehicles will use those roads that already exist.

To prevent soil erosion and loss of fertile soil, reinstatement of top soil and rehabilitation of construction areas will be undertaken to restore disturbed areas as far as possible to the pre-existing condition of land.

In order to prevent accidental spillages of hazardous materials such as fuels and oils, re-fuelling activities will take place in designated areas over sealed ground or catch

basins and with spill-response kits present. Similarly, hazardous materials will be stored in covered and secure areas over sealed ground with appropriate secondary containment (110% volume of the largest tank).

8.1.2.2 *Gas Pipeline*

The pipeline spread will be clearly marked prior to construction activities so as to clearly indicate the boundaries of the spread within which all pipeline installation activities are to take place. Top and subsoil horizons will be removed in a controlled manner and stock-piled separately in close proximity to where it originated. Upon completion of pipe-lay activities, top and subsoil will be replaced. The running track used for vehicle trafficking will predominantly be on subsoil with stone or bog mat construction used where ground conditions require. These measures will ensure that soil structure and fertility is preserved. After construction of the gas pipeline a 5.8 km section of the running track will remain. For servicing other sections of the pipeline the current roads in the field will be used.

Compensation for land acquisition for construction of the 15km gas pipeline is discussed in section 8.8.1.4.

All disturbed areas will be rehabilitated following completion of construction activities. Disturbed areas will be restored as far as possible to the pre-existing condition of land prior to pipeline construction. With appropriate re-instatement, no long term loss of agricultural land or fertility should result.

Normal operation of the pipeline will not result in further disturbance to soils, however ongoing monitoring/maintenance of the pipeline will be undertaken to ensure that there are no ongoing issues or new developments such as erosion/pooling of water etc as a result of pipeline works.

Appropriate geotechnical studies will be carried out as part of the detailed engineering design phase of the pipeline and where weak soils are encountered, the most appropriate pipeline installation method will be used and/or trench walls will be supported (piling etc) or battered back to provide sufficient stability.

8.2 Air Quality

8.2.1 Impacts

8.2.1.1 *Oil Treatment Unit (OTU) Extension, GTP, LPG Terminal and Water Re-injection Plant*

During the construction phase of the OTU extension, installation of the GTP, LPG Terminal and Water Re-injection plant the main atmospheric emissions will be in the form of dust (PM_{10} and $PM_{2,5}$) and diesel fumes (NOx, SO_2, CO) as a result of earthmoving/backfilling and construction activities. Not only will the abovementioned emissions be generated on-site but also along the road networks used by construction traffic.

Operation of the OTU and GTP following expansion works will result in 98% decrease in emissions as a result of utilisation of associated gas. The GTP will utilise associated gas in a number of ways;

- Methane and ethane will be produced from associated gas and will be transported by the gas pipeline to the Intergas Central Asia gas pipeline to be exported for sale in the local market.
- H2S in the gas will be neutralised by a sulphur recovery plant that will produce marketable pelletised sulphur.
- The rest of the gas will be fractionated to produce propane and butane which will be transported to a LPG terminal near Uralsk. Zhaikmunai estimate that they will produce 15,000 tonnes of liquefied petroleum gas (LPG) per year.
- Petroleum resin (C5) will be stabilised and sold.
- The GTP will have three 15 mw gas turbines (6,000 volts) which will use associated gas (methane and ethane) to produce power for most of the facilities at the Chinarevskoye Field. This will therefore significantly reduce the amount of electricity consumed on site.

Gas powered energy generation is more efficient than using other fuels, such as coal and oil and contributes fewest Greenhouse Gases to the atmosphere. It will also result in fewer point sources of emissions at the Chinarevskoye field associated with energy sources such as diesel generators and boilers.

With a 98% reduction in emissions from the abovementioned proposed facilities, the cumulative emissions impact from all facilities will be negligible.

The LPG terminal will utilise the same method of emissions control as the existing oil terminal during operation. All systems will be closed and will be linked to a vapour recovery unit (VRU) which will collect 96-98% of all gas and vapours produced.

With a 96-98% reduction in emissions from the abovementioned proposed facilities, the cumulative emissions impact from all facilities will be negligible.

No significant air emissions will be associated with normal operation of the Water Re-injection Plant.

8.2.1.2 *Gas Pipeline*

The major source of air emissions from the working width is the potential for dust rise (PM_{10} and $PM_{2,5}$) from vehicle trafficking on the un-surfaced running rack that is used to transport plant and machinery along the working width. Dependant on control measures and emission rates, impacts are not usually noticed beyond 100m from the local site of works.

Another source of air emissions during the construction phase will be diesel fumes (NOx, SO_2, CO) which will arise from the machinery used on site during the construction period. Pipeline construction usually involves the use of heavy civil engineering equipment on site as well as delivery to site, by lorry, of large quantities of materials. Impacts may therefore arise both in areas adjacent to the working width and on the road network leading to access points.

In terms of potential receptors, the pipeline route does not come within close proximity to any residential properties. The closest population areas are Chinarevo village (6.8 km) and Petrovo village (8.3 km).

The Gas Pipeline will operate as a completely closed system and as such, in normal operation there will be no release of gas to the atmosphere.

Periodically, at intervals of approximately ten years, the pipeline will be 'pigged,' Depressurising the pig traps at each end of the system will involve the release of minor and controlled quantities of natural gas. Therefore only minor, temporary impacts to the existing air quality are anticipated and the magnitude of this impact is low.

In the unlikely event of a major release of gas from the pipeline, the concentration would be high in the immediate vicinity of the leak. However appropriate risk assessments will be carried out to minimise the potential of such an occurrence.

8.2.2 Mitigation

8.2.2.1 *Oil Treatment Unit (OTU) Extension, Installation of GTP, LPG Terminal and Water Re-injection Plant*

Construction practices will be developed to control dust and diesel emissions for all planned expansions. This will include spraying of active work areas with water to dampen down dust during sustained dry conditions and vehicle speed reduction across the Site.

Mitigation measures for operational air emissions at the OTU extension, the GTP and the LPG Terminal will be associated with maintaining the closed (air tight) systems to prevent any emissions. This will involve the following design solutions;

- Protect technical and inflow pipelines from mechanical damage by use of shielded enclosures and intense anticorrosive isolation for underground pipelines;
- Controls of pipeline and equipment pressure which will allow immediate identification of damage and will automatically shut down the equipment;
- Selection of equipment, valves and fittings and regulating valves strictly in accordance with operating equipment;
- Locating of process units, valves and utilities at the distance required by standards, functional purpose and wind rose;
- Timely conduction of scheduled repair works and maintenance of process equipment and pipelines; and
- A flow line cleaning system.

8.2.2.2 *Gas Pipeline*

Construction practices will be developed to control dust and diesel emissions for the Gas Pipeline. This will include the following reduction and suppression techniques:

- Spraying of the working width with water to dampen down the dust during sustained dry conditions;
- Vehicle speed will be restricted along the working width in dry conditions to minimise dust disturbance;
- Visual monitoring of dust generation will be undertaken during the works and mitigation instigated if elevated off-site emissions arise.

As there are no potential receptors within 5 km of the pipeline these practices will not require a high level of control as the potential impact is negligible.

8.3 Water and Wastewater

8.3.1 Impacts

8.3.1.1 *Water Supply and Wastewater at the OTU extension*

Water supplies will be required for the extension to the OTU in the construction and operation phase. Process, potable and fire-fighting water will be required for general purposes, human consumption and emergency response, respectively.

The process water requirements of the operation of the extension to the OTU will be approximately 5 m^3 per day and 1,825 m^3/year. Process and fire-fighting water will be abstracted from groundwater reservoirs, using abstraction wells across the Chinarevskoye field. See Table 18 for details of water use.

Table 18: OTU extension Water Demand

Phase	Water Type	Water Requirement
Construction	Potable	Construction workforce
	Process	General purposes
	Fire-fighting	Emergency response
Operation	Potable	Zhaikmunai Operators
	Process	OTU
	Fire-fighting	Emergency response

The nature of wastewater generated during the life of the extension to the OTU will be similar to that of the existing OTU and is summarized below in Table 19. Process wastewater will be treated using sediment tanks and sent to a bulk process water storage tank to be re used in the OTU. Process wastewater may also be used in the water re-injection plant to maintain reservoir pressure.

Table 19: OTU extension Wastewater

Phase	Wastewater Type	Wastewater Source
Construction	Sanitary	Construction workforce
	Process	General purpose
	Storm	Rainfall events
Operation	Sanitary	Zhaikmunai Operators
	Process	OTU waste water
	Storm	Rainfall events

8.3.1.2 *Water Supply and Wastewater the GTP*

Water supplies will be required for the GTP in the construction and operation phase. Process, potable and fire-fighting water will be required for general purposes, human consumption and emergency response, respectively.

The process water requirements for the operation of the GTP will be 300 m^3 per day. The contractor (KSS) has installed 10 groundwater abstraction wells to provide process and fire-fighting water.

The operation of the GTP will result in large quantities of saline wastewater which will be used in the Water Re-injection Plant. To accommodate this, a WWTP will be constructed which will treat process water to ensure that it meets regulatory requirements for re-injection.

8.3.1.3 *Water Supply and Wastewater at the LPG Terminal*

Water supplies will be required for the LPG Terminal in the construction and operation phase. Process, potable and fire-fighting water will be required for general purposes, human consumption and emergency response, respectively.

The LPG terminal will not require a significant amount of process water. The main use of process water will be for washing equipment. Process and fire water will be abstracted from groundwater abstraction wells.

Wastewater at the LPG terminal will be limited and will mainly be associated with washing purposes. Process and domestic wastewater at the LPG terminal will be treated in a WWTP and will then be re-used (same system as the existing Oil Terminal).

8.3.1.4 *Water Supply and Wastewater at the Gas Pipeline*

Water supplies will be required for the Gas Pipeline mainly during the construction phase. Process and potable water will be required for general purposes and human consumption, respectively.

Process water requirements during pipeline activities will be required during the construction phase for the following activities:

- Dust suppression along the working width;
- General construction activities; and
- Hydrostatic testing of the pipeline.

These activities could generate a series of potential impacts:

- Derogation of flows in surface waters during precipitation events;
- Discharge of polluted waters to stream; and
- Lowering of water table at abstraction point.

Necessary water required for hydrostatic testing of the pipeline will be supplied from nearby water bodies. Process water required for activities such as dust suppression will also be sourced from local water bodies.

Dependent on the distance of pipeline to be hydrostatically tested and volume of water required at any one point in time, there may be an impact on local aquatic environments resulting from the abstraction of hydrostatic test water and discharge on waste water upon completion (depending on quality).

Process water for the gas pipeline will be used in dust suppression; however this will not represent a major operation, due to the relatively remote location of the pipeline in relation to local receptors. Some dust suppression using water bowsers may be required during prolonged dry periods, in areas adjacent to some agricultural crops.

As the general water table is located some 20 m below ground level and trench excavation activities will take place in the upper 1-2 m of soil, it is unlikely that any significant trench dewatering activities will be required.

The potential exists for pollution of surface and/or groundwater sources from uncontrolled discharges of fuels, oils and chemicals used on site during pipeline construction activities.

Pollution can occur from leaks of fuels, hydraulic oils or other fluids from construction plant, during operation or transit, or from areas in which such fluids are stored. Risks can also arise during re-fuelling and maintenance operations. Inadequate controls on the storage, handling, use and disposal of potentially harmful chemicals could lead to pollution of groundwater. These potential impacts will be mitigated using appropriate hazardous materials storage and handling procedures which are discussed in section 9.6.

Water supply for the pipeline during the operational phase will be negligible. The pipeline will be designed to reduce to a minimum any impacts during operation.

As pipeline operation activities do not typically involve significant uses of water, in general, water impacts during construction will be temporary in nature and confined to those particular periods of pipeline construction when water abstraction is required.

8.3.1.5 *Water Supply and Wastewater at the Water Re-injection Plant*

Water supplies will be required for the Water Re-injection Plant in the construction and operation phase. Process, potable and fire-fighting water will be required for general purposes, human consumption and emergency response, respectively.

Process water requirements of the Water Re-injection Plant at present are approximately 200 m^3/day but from the start of 2010 the process water requirements on a daily basis will be approximately 3,500 m^3/day.

8.3.2 Mitigation

8.3.2.1 *Water Supply at the Extension to the OTU, Installation of GTP, LPG Terminal and Water Re-injection Plant*

Process and fire-fighting water supply for the extension to the OTU, the GTP and the LPG Terminal will be taken from abstraction wells in groundwater reservoirs.

Similarly water supply for the Water Re-injection Plant will be obtained from groundwater abstraction wells and from process wastewater from the GTP which will be treated in a WWTP before re-injection.

Mitigation measures will be required to prevent the depletion of groundwater reservoirs. This will include;

- Metering overall water consumption;
- Adhering to permitted volumes of water abstraction; and
- Reutilizing groundwater for technical uses.

Mitigation measures to prevent the contamination of groundwater reservoirs will also be required. This will include;

- Use of closed systems;
- Prevention of all types of discharges to the water basin;
- Use of metering devices;
- Use of closed rain and storm water runoff systems from any process areas;
- Control of the welded joints of steel pipelines;
- Conduct structural and leak tests of equipment and pipelines;
- Utilize industrial waste: re-process oil products from oil drainage units;
- Control operation of septic tanks: identify quantity of suspended substances and response activity of pH medium directed to septic tank in runoff water and in outgoing water;
- Conduction within industrial monitoring frames;
- Continued monitoring of surface water in Embulatovka river; and

- Continued monitoring of ground water condition.

Potable water for all planned expansions will be supplied by the same contractor who currently supplies the existing Zhaikmunai facilities (Firma Lodnik).

8.3.2.2 *Water Supply for the Gas Pipeline*

All potable water for construction workers will be supplied by the same contractor who currently supplies the existing Zhaikmunai facilities (Firma Lodnik).

Process water for hydrostatic testing will be supplied from nearby water bodies. The volume of water used for this process will be approximately 1,095 m^3 and will be required to be abstracted from neighbouring water bodies which will likely be carried out using bowsers. Considering the volume of water in neighbouring water bodies it is not considered that this volume of water abstracted will have a significant impact. This will be agreed with the local authorities.

8.3.2.3 *Wastewater at the Extension to the OTU, Installation of GTP and LPG Terminal*

Sanitary wastewater during the construction phase of the extension to the OTU, and installation of the GTP will either be collected using mobile eco-toilets and will be collected and appropriately disposed of by a Third party contractor, under contract or it will be will be transferred into the sanitary wastewater collection/treatment system of the existing OTU. During the operational phase sanitary wastewater will be treated in a WWTP for use in the Water Re-injection Plant.

Likewise, sanitary wastewater during the construction phase of the LPG Terminal will either be disposed of by a Third party contractor or it will be will be treated in the WWTP of the existing Oil Terminal for reuse as process water. During the operational phase of the LPG Terminal sanitary wastewater will be treated in a WWTP for reuse as process water.

Process waste water generated during the construction phase of the installation of the OTU, the GTP and the LPG Terminal has the potential to be contaminated and hence will be collected using septic tanks and will be collected and appropriately disposed of by a Third party contractor, under contract. Or in the case of the LPG Terminal it will be treated in the WWTP of the existing Oil Terminal for reuse as process water. Once operational, process wastewater from the extension to the OTU will either be treated in sediment tanks and returned to a bulk process wastewater storage tanks to be reused, or it will be treated in a new WWTP and used in the Water Re-injection Plant. Process wastewater from the GTP will be treated in the

new WWTP for use in the Water Re-injection Plant. The sludges/sediments generated from the WWTP will be characterised by leachate tests in order to establish the acceptance criteria and resulting procedure for appropriate disposal.

Similarly during the operation of the LPG Terminal, process wastewater will be treated in a WWTP and reused in the processes of the LPG Terminal. The sludges/sediments generated from the WWTP will be characterised by leachate tests in order to establish the acceptance criteria and resulting procedure for appropriate disposal.

Rain / storm water generated initially over unsealed ground during the construction phase of the extension to the OTU, installation of the GTP and LPG Terminal will infiltrate into the soil. Any storm water which results in surface ponding will be collected and transferred into the existing rain/ storm water drainage system of the OTU or the Oil Terminal. During operation of the extension to the OTU, the GTP and the LPG Terminal all equipment will be constructed with sloping concrete bases and concrete bunding which will collect storm and rain water in concrete evaporation pits. There will also be open evaporation concrete chambers located around the site which will collect general storm and rain water run-off from all facilities. These drainage systems will be separate and closed systems. If the volume of water reaches a certain level, the water will be pumped out and transported to a septic tank which will be collected and appropriately disposed of by a Third party contractor, under contract.

8.3.2.4 *Wastewater at the Gas Pipeline*

The majority of wastewater produced by the pipeline will be as a result of hydrostatic testing activities. Prior to any hydrostatic testing, the pipeline will be pre-cleaned using compressed air. Pre-cleaning of the pipeline with compressed air will ensure that contamination, if any, of hydrostatic water is kept to an absolute minimum. After testing hydrostatic wastewater will also be treated by filters and disposed of into filtration fields for evaporation. This will mitigate against contamination of receiving water bodies. The location of the filtration fields will be agreed with local environmental authorities.

Management of sanitary waste water generated by personnel during the construction activities will be provided by mobile eco-toilets, based on contracts with permitted operators, who will also provide collection and appropriate disposal services of such waste water.

8.3.2.5 *Wastewater at the Water Re-injection Plant*

No mitigation measures are required.

8.4 Biodiversity

8.4.1 Impacts

8.4.1.1 *Extension to the OTU, Installation of the GTP, LPG Terminal and Water Re-injection Plant*

None of the planned expansions are situated near to any protected areas.

The extension to the OTU will be within the perimeter of the existing OTU in an area previously used for oil loading activities. It is unlikely that the construction of the extension to the OTU will have an adverse effect on local biodiversity.

Given the close proximity of the GTP to the existing OTU and the presence of construction equipment already on site it is unlikely that the construction of the GTP will have an adverse effect on local biodiversity.

Photograph of the construction site of the GTP

The LPG terminal will be situated next to the perimeter of the existing oil terminal. The site is not considered likely to provide habitat for protected species which may have migrated and settled. It is unlikely that the construction of the LPG terminal will have an adverse effect on local biodiversity.

Given the close proximity of the water re-injection plant to the existing OTU, exploration and production wells and network of roads, it is unlikely that the construction of the water re-injection plant will have an adverse effect on local biodiversity.

During operation, all facilities will be surrounded by a secure perimeter fence and any ground surface areas under equipment will be paved and bunded in order to control surface water drainage as well as eliminate any combustible materials presenting a fire hazard. Therefore adverse impacts on existing biodiversity during operation will be very limited.

8.4.1.2 *Gas Pipeline*

Land across which the pipeline passes is predominantly covered by agricultural crops and there are no protected areas.

The pipeline construction will have the potential to cause the following potential temporary generic impacts on biodiversity:

- Loss of habitat due to vegetation removal, soils stripping and trenching operations;
- Disturbance and potential harm to fauna species due to the operation of heavy engineering plant and equipment; and
- Impacts from increased traffic on local roads.

Cumulative potential impacts on biodiversity are considered as low, due to:

- Limited duration of construction phase – about 6 months; and
- Land restoration after the completion of construction works.

8.4.2 Mitigation

No mitigation measures are planned for the extension to the OTU, installation of the GTP, LPG Terminal and Water Re-injection Plant.

Mitigation measures for the Gas Pipeline will consist of undertaking an appropriate flora and fauna survey along the length of the pipeline to identify the nature of species present and any protective measures necessary.

8.5 Landscape

8.5.1 Impacts

In assessing the effects of the planned expansions, thresholds of significance were developed as a function of the sensitivity of the landscape and visual resource and the magnitude of resulting change in the baseline conditions (i.e. “impact”) from the Plant.

Landscape impacts were assessed as changes in the fabric, character and quality of the landscape and its ability to accommodate change. Using the criteria outlined below in Table 20, landscape impacts associated with the construction and operational phases of the planned expansions were assessed and the results are presented in Table 21 below;

Table 20: Sensitive Landscape Receptors and Magnitude of Impact

Sensitivity (vulnerability of receptor to change)		Magnitude (size, extent and duration of impact)
Landscape of particularly distinctive character, susceptible to relatively small changes.	High	Noticeable change in landscape characteristics over an extensive area or very intensive change over a more limited area.
Landscape of moderately valued characteristics, reasonably tolerant of changes.	Medium	Moderate changes in localised area.
Landscape of relatively indistinctive character, the nature of which is potentially tolerant of substantial change.	Low	Slight change in any components.
An unimportant landscape capable of substantial change	Not Sensitive	Virtually imperceptible change in any components.

Table 21: Landscape Impacts of Planned Expansions

Planned Expansion	OTU Extension	Installation of GTP	LPG Terminal	Gas Pipeline	Water Re-injection Plant
Sensitivity of Receptors	Low-Not Sensitive	Low-Not Sensitive	Medium Sensitive	Low-Not Sensitive	Low-Not Sensitive
Magnitude of Change	Slight-virtually imperceptible change	Noticeable-moderate change	Noticeable-moderate change	Slight-virtually imperceptible change	Slight-virtually imperceptible change
Nearest Potential Receptor	Rozhkovo village being relocated; Chesnokovo village11 km	Rozhkovo village being relocated; Chesnokovo village11 km	Beles Village 2 km	Chinarevo village 6.8 km	Rozhkovo village being relocated; Chesnokovo village11 km
Location	Within perimeter of existing OTU	In close proximity to existing OTU	Next to perimeter of Oil Terminal	Typical plains landscape, with the dominant land use being agriculture	In close proximity to OTU, wells and road network
Facilities	Similar facilities to existing OTU, in an area previously used for oil loading	New facilities in area approximately 10ha	New facilities, similar area to Oil Terminal	None visible after recultivation. Some facilities during construction	Minimal facilities visible
Impact	Low	Low	Low	Negligible	Negligible

Visual impacts were assessed solely as changes in available views of the landscape, and the effects of those changes on people. The sensitivity of a visual receptor was therefore based on the viewer's familiarity with the scene, the activity or occupation that brings them into contact with the view and the nature of the view, whether full or glimpsed, near or distant.

The magnitude of the visual impact was determined by the perceived contrast or integration with the existing scenic features and aesthetic character of the view in terms of its form, line, colour, texture and scale.

Using the criteria outlined in Table 22, visual impacts associated with the construction, operational and phases of the planned expansions were assessed;

- Extension to the OTU was assessed as being not sensitive and insignificant magnitude.
- GTP was assessed as being not sensitive and insignificant magnitude.
- Gas Pipeline was assessed as being not sensitive and negligible magnitude.
- LPG Terminal was assessed as being low sensitive and insignificant magnitude.
- Water Re-injection Plant was assessed as being not sensitive and negligible magnitude.

Table 22: Sensitive Visual Receptors and Magnitude of Impact

Sensitivity (vulnerability of receptor to change)		**Magnitude (size, extent and duration of impact)**	
Residential properties with immediate foreground views of the proposed project.	High	Majority of viewers are affected or major changes in the view.	Dominant
Residential properties with mid-ground/limited views of the proposed project. Local side roads and lanes.	Medium	Many viewers affected or moderate changes in the view.	Prominent
Offices, commercial developments and industrial sites. Main roads.	Low	Few viewers affected or minor changes in the view.	Insignificant
Existing cultural heritage features without views or where the activity dominates the focus of users	Not Sensitive	Views are not important	Negligible

8.5.2 Mitigation

No mitigation is planned

8.6 Hazardous Materials Handling/Storage

8.6.1 Impacts

8.6.1.1 *Extension to the OTU, installation of the GTP, LPG Terminal, Gas Pipeline & Water Re-injection plant*

During the construction and operation phase of all planned expansions, there will be a requirement to store hazardous materials on-site such as fuels, oils, lubricants, acids, alkalis, etc for machinery/vehicle operation/maintenance and processes.

During the operation of the extension to the OTU raw materials currently being stored on site for the existing OTU detailed in Table 23 below will also be stored.

Table 23: Raw Materials Stored at the OTU

Raw Material	Storage Area	Source
Demulsifying agent (DMO 86319)	Cold Storage Warehouse & around OUT	Baker Petrolite, UK
Corrosion Inhibitor (CGW85567)	Cold Storage Warehouse	Baker Petrolite, UK
Bactericide (XC80102)	N/A	Baker Petrolite, UK
Scale inhibitor (SCW 85143)	N/A	Baker Petrolite, UK
Caustic Soda (NaOH)	46% solution kept in process tank T-1 at OTU	Topan, Uralsk
Catalyst (Ivkaz)	Cold Storage Warehouse	Vinius, Kazan, Russia

The extension to the OTU will include the construction of a bulk oil storage container (5,000 m³ capacity) and bulk diesel containers (50 m³ capacity).

Improper storage and handling of the abovementioned materials could result in ground contamination of bare earth surfaces/surface drains as well as present an occupational health and safety hazard.

8.6.2 Mitigation

8.6.2.1 *Extension to the OTU, installation of the GTP, LPG Terminal, Gas Pipeline & Water Re-injection plant*

Fuels and oils used during construction will be stored in secure bunded enclosures at the main construction site compound. The enclosures will have impermeable and chemically resistant bases and a minimum retention capacity of 110% of the largest

tank or 25% of the combined tank volume equal or greater than 1000L (IFC EHS Guidelines, 2007).

It is likely that any hazardous or raw materials for the extension to the OTU will be stored in the existing chemical storage areas at the OTU, which consist of a lockable large warehouse with a corrugated iron roof and a concrete floor. To ensure this area complies with EU BREF and IFC requirements a robust method of secondary containment, such as a 6-12" concrete lip/bund will be installed to the floor around the warehouse perimeter to protect against any spills or leaks.

The bulk oil and fuel storage tanks will require storage in secure bunded enclosures within the perimeter of the extension to the OTU. These will be situated on concrete bases and the bunding will be of an impermeable nature, typically a clay mat or clay embankment with a bitumen layer and the bunded area will have a minimum retention capacity of 110% of the largest tank or 25% of the combined tank volume equal or greater than 1000L (IFC EHS Guidelines, 2007).

Care will be taken to ensure that equipment and storage facilities are protected by secure fences and locked up where possible, with spill response plans/kits, drip trays and trained personnel available. Appropriate techniques and management measures to prevent spillages reaching watercourses, such as a drainage isolation points, gullies or oil interceptors, will be included, as required, in the site drainage system.

Self-bunded or double-skinned mobile bowsers will be used for the storage and transportation of fuels on site and re-fuelling will be carried out by suitably trained personnel in a dedicated re-fuelling area. Unnecessary transportation of fuels and potentially polluting chemicals will be minimised and all vehicles, including the fuel bowser, will carry emergency spill response kits.

Areas designated for the storage and/or use of hazardous substances and chemicals will be remote from drains, and suitable secondary containment will be used to prevent the uncontrolled migration of any spilled substances.

Any accidental spillages of fuels, oils or chemicals will be immediately cleared up using specialised spill response kits (including absorbent pads and absorbent granules or similar material) to prevent any risk of pollution. Procedures will be developed for emergency response, pollution control and waste management to ensure incidents are reported, cleaned up and contaminated materials disposed of responsibly to a licensed facility in compliance with waste legislation.

8.7 Noise

8.7.1 Impacts

8.7.1.1 *Extension to the OTU*

In relation to sensitive receptors, road traffic comprising of light and heavy goods vehicles travelling to/from the OTU will present the largest noise source during the operational and construction phase of the extension to the OTU. However as Rozhkovo village is being relocated, the nearest potential receptor is Chesnokovo village which is located 11km away, therefore the impact of noise from construction and operational traffic is thought to be minimal.

At present noise levels in the existing OTU do not exceed the maximum permissible levels that comply with the requirements of Sanitary Code No.1.02.007-94 (Sanitary Standards for Permissible Noise Levels at Workplaces). Since the extension to the OTU will consist of the same systems and processes as the existing OTU, but will be using updated technologies, it is unlikely that any issues associated with noise will exist during the operational phase.

8.7.1.2 *Installation of the GTP*

The GTP will be located next to the existing OTU and as such the only sensitive receptor will be located 11 km away. The largest noise source during the construction phase of the GTP will be associated with traffic comprising of light and heavy goods vehicles travelling to/from the GTP. During the operational phase it is likely that the gas turbines which will form part of the GTP and be used to generate power, will also present a source of noise. However this impact is thought to be minimal due to the lack of potential receptors in close proximity.

Noise generated by the gas turbines has the potential to exceed permitted noise levels for worker occupational health within the GTP as well as ambient noise levels around the border of the GTP.

8.7.1.3 *LPG Terminal*

LPG will be transported from the GTP at the Chinarevskoye field by road tankers to the LPG terminal. In relation to sensitive receptors, such as the nearby settlement of Beles village (located 2km away), this road traffic and additional construction traffic will present the largest noise source during the operational and construction phase of the LPG terminal, however this impact is thought to be minimal.

No other noise sources are anticipated in relation to the LPG terminal.

8.7.1.4 *Gas Pipeline*

Installation of the pipeline will be constructed using the normal (open cut) spread technique. During pipeline installation, the following noise sources will exist:

- Trenching machinery / 360° excavators;
- Generators;
- Trucks, tractors and other delivery vehicles;
- Loaders;
- Side boom tractors and cranes;
- Soil tamping equipment or rollers;
- Shot blasting equipment;
- Pumps;
- Air compressors; and
- Drilling installations.

There is the potential for noise to be generated from pumps, generators and compressors during testing and pigging operations. However, given that this machinery will only be in operation temporarily in isolated locations and the nearest dwelling is 6.8 km away any disturbance is not considered significant.

Transportation of construction materials will generate an increase in noise levels in the localities crossed by access roads.

The main noise impact of the pipeline is considered to take place during the peak of the six month construction period, with a much smaller number of vehicle movements associated with materials delivery during the pre- and post-construction phases.

However due to proximity with residential areas noise impacts are thought to be minimal.

The operational phase of the pipeline will not generate noise.

8.7.1.5 *Water Re-injection plant*

It is unlikely that any significant issues related to noise will be associated with the construction and operation of the Water Re-injection Plant.

8.7.2 Mitigation

8.7.2.1 *GTP*

The gas turbines, as part of the standard construction package from the supplier (KSS), will be built into special noise attenuation enclosures, with silencers integrated into the gas turbine air intake and exhaust gas outlet channels. Annual personal noise monitoring will be carried out immediately adjacent to worker areas within the GTP to control occupational noise exposures.

8.7.2.2 *Gas Pipeline*

In order to reduce noise impacts of the construction phase of the Gas Pipeline, basic mitigation measures will be provided for the construction phase. The Contractor will agree with the representatives of local public authorities the working hours/days.

Machinery will be fitted with effective silencers where available and all equipment will be kept in good working order.

Equipment and plant in intermittent use will be shut down or throttled down to a minimum when not in use. Care will be taken to minimise noise when loading or unloading vehicles or moving material.

8.7.2.3 *Extension to OTU, LPG Terminal and Water Re-injection Plant*

Due to the minimal noise impacts of these planned expansions, no further mitigation measures are planned.

8.8 Socio-Economic

8.8.1 Impacts

8.8.1.1 *Labour and Working Conditions*

The number of additional Zhaikmunai personnel required for each expansion project following construction will be approximately;

- Gas Treatment Plant - 90 people
- Extension to the Oil treatment Plant - 90 people
- LPG Terminal – 50 people
- Water Re-injection Plant – 10 people

Also involved in the construction and day-to-day operation of the planned expansions will be a number of contractors, providing both goods and services, for example KazStroy Service.

8.8.1.2 *Employment and Local Economy*

One of the positive effects of the planned expansion projects will be associated with increases in tax collection to fund social infrastructure projects. Currently Zhaikmunai pay annual payments of $300,000 (USD) which have been used to fund development of, among others, the following local public infrastructure:

- Restoration works in a local concert hall;
- Repair of a local sports stadium;
- Repairs to a local sanatorium;
- Grant to the Union of Women of Kazkhstan;
- Re-building fences around the grave areas of local villages; and
- Installation of gas supply lines from the 'Openburg-Novopskov' pipeline, operated by Intergas Central Asia (Sub division of KazTransGaz) to 12 local villages.

Funds from Zhaikmunai tax payments in future will be used to support a number of similar public infrastructure projects.

On a local scale the LPG Terminal will provide a long term benefit in facilitating the supply of LPG to the local market. As part of their Nature Use permit Zhaikmunai must supply LPG to the local Western Kazakhstan Market in the amount of 50,000 tonnes per year.

The Gas Pipeline will have a potential long term benefit in facilitating the supplies of gas into the National Gas Network. This will increase the security of energy supply and create the technical possibility of natural gas supply of the localities in the nearby vicinity of the pipeline.

8.8.1.3 *Land Acquisition*

As the extension to the OTU will be constructed within the confines of the existing OTU on land which is operated by Zhaikmunai and leased until 2031 with an entitlement for further extension of the lease, no land acquisition will be required from Third parties for the development.

Likewise the installation of the GTP will be constructed on land which is leased by Zhaikmunai until 2031 with an entitlement for further extension of the lease, and therefore no land acquisition will be required from Third parties for the development.

The LPG Terminal and the Water Re-injection Plant will also be situated on land leased from local land owners.

Once all facilities are decommissioned they will be rehabilitated according to Zhaikmunai's Standard working project for rehabilitation of facilities (document doc: 1.1.a and 1.1 b) and the rehabilitation will be approved by the land owner before it is returned to them.

8.8.1.4 *Land Acquisition for the Gas Pipeline*

The route of gas pipeline will cross two agricultural farms and land belonging to the Yanvartsevskiy District. The statistics on the agreements for right-of-way are as follows:

- Total number of landowners identified – 3;
- Total area affected by gas pipeline – 35.4ha;
- Total area secured by rights-of-way agreements – 35.4ha (100%);
- Total number of rights of way agreements signed – 3

Servitude agreements have been concluded with all three landowners for the period of gas pipeline construction (until the end of 2009). After completion of construction the land will be rehabilitated and returned to the owners. Agricultural land, which is part of the pipeline protection zone, according to the law of RoK, shall not be withdrawn.

Servitude agreements were signed on willing basis and the amount of compensation under the Servitude Agreement was determined based on direct negotiations with

land owners and completely covered possible expenses and loss of profit. The compensation payment was calculated based on the soil category and quantity of produced crops.

During the practicing servitude agreements (the last 2-3 years) Zhaikmunai have recieved no complaints from the Land owners and they were satisfied that they were not “worse off”. Upon completion of land reclamation works after the pipeline has been constructed and the expiry of the servitude agreements, a two-party land relinquishment act will be signed by Zhaikmunai and the land owners to confirm that land has been returned to an acceptable condition. In case of any claims by the land owners, such act will not be signed until all defects have been removed by Zhaikmunai.

Potential socio-economic impacts during construction include:

- Temporary reduction of property area;
- Temporary impacts on the land areas of working width, resulting in a temporary reduction of income obtained from the sale of agricultural produce;
- Reduction of potential annual income from the sale of farm produce, due to reduced areas under cultivation; and
- Reduction of the potential land uses due to building/plantation restrictions under the law.

Potential socio-economic impacts during operation include:

- Reduction of property area;
- Reduction of potential annual income from the sale of farm produce, due to reduction in cultivated areas; and
- Reduction of the potential land uses due to building/plantation restrictions under the law.

Impact mitigation measures include:

- Payment of fair prices for rights-of-way;
- Defining and enclosing the working areas, to avoid impact on any additional adjacent areas;
- Appropriate topsoil management:
- Stockpiling the topsoil on site, on well-defined, dedicated and specially equipped horizontal platforms (to avoid slides), and establishing measures to maintain humus quality and nutrient concentrations;
- Re-use of topsoil in the restoration of impacted land;
- Transfer of any leftover materials to Third parties;
- Appropriate subsoil management;
- Appropriate management of materials to avoid impacts in soil quality;
- Appropriate waste management; and

- Rehabilitation of land within the work areas after the completion of construction works.

8.8.1.5 *Community Health, Safety and Security*

Increases in road traffic will occur during the construction and operation of all of the planned expansions. This increase in road traffic could present an increased public safety risk, given current driving standards in Kazakhstan.. However given the proximity of settlements to planned expansions this is not considered as having a significant impact.

8.8.1.6 *Cultural Heritage*

The term, cultural heritage, is defined as a group of resources inherited from the past which people identify, independently of ownership, as a reflection and expression of their constantly evolving values, beliefs, knowledge and traditions. It encompasses tangible (physical) and intangible heritage, the boundaries of which are a subject of considerable debate among heritage experts.

Physical cultural heritage are identified as movable/immovable objects, sites, groups of structures, and natural features and landscapes that have archaeological, palaeontological, historical, architectural, religious, aesthetic or other cultural significance.

Intangible cultural heritage is referred to as being the practices, representations, expressions, knowledge, skills – as well as the instruments, objects, artifacts and cultural spaces associated therewith – that communities, groups and, in some cases, individuals recognise as part of their cultural heritage and which are transmitted from generation to generation.

Based on the following reasoning, it is not thought that there are any significant cultural heritage impacts associated with the extension to the OTU, installation of the GTP and LPG Terminal and the Water Re-injection Plant in their proposed locations;

- They will all be located within or close to the perimeter of existing Zhaikmunai facilities;
- They are not located in any listed protected areas;
- There has been no evidence at any of the existing facilities of cultural heritage resources; and
- There are no known cultural heritage sites in the vicinity of any of the facilities.

However the possibility exists that archaeological remains may be discovered, particularly during site excavation activities.

8.8.1.7 *Gas Pipeline*

The pipeline corridor does not cross any listed protected areas and there are no known archaeological or cultural heritage resources within the vicinity of the pipeline.

However the possibility exists that archaeological remains may be discovered, particularly during site excavation activities.

8.8.2 Mitigation

8.8.2.1 *Labour and Working Conditions*

In order to comply with industry best practice, a number of written policies and procedures should be established and implemented by Zhaikmunai. This will include;

- An official grievance procedure; and
- A written non-discrimination and equal opportunities policy.

8.8.2.2 *Land Acquisition, Involuntary Resettlement and Economic Displacement*

No mitigation measures are required for land acquisition in association with the Gas Pipeline.

8.8.2.3 *Cultural Heritage*

During the construction phase for all planned expansions, as there remains a possibility that archaeological remains can be discovered, particularly during site excavation activities, a procedure will be in place to ensure that any archaeological remains are identified and protected. In case of any chance finds/discovery of archaeological remains, works should cease and the area of the discovery should be sectioned off and the local department of the Ministry of Culture of the RoK notified so that the discovery can be appropriate recorded and protected if necessary on a permanent basis.

8.9 Summary of Impact and Mitigation of Planned Expansions

A summary of the impacts and mitigation measures for all of the planned expansions is presented in Table 24 below.

Table 24: Summary of Impacts and Mitigation of Planned Expansions

	Impact	Phase	Mitigation
Soils, Geology and Hydro-geology	Soil compaction from operation and movement of heavy vehicles	Construction	• Top soil will be removed and stock-piled for re-use • Series of dedicated road ways will be used • Roadways will be clearly marked. Where possible, vehicles will use those roads that already exist • The running track used for vehicle trafficking for the gas pipeline will predominantly be on subsoil with stone or bog mat construction used where ground conditions require.
	Loss of fertile agricultural land	Construction	• All disturbed areas will be rehabilitated using top soil following completion of construction activities • Disturbed areas will be restored as far as possible to the pre-existing condition of land
	Deteriorating soil and groundwater conditions	Operation	Baseline assessment and ongoing monitoring of soil and groundwater conditions
Air Quality	Reduction in air emissions by 98%	Operation	No Mitigation Planned
	Emissions to air from process systems	Operation	Maintaining closed systems
Water and Wastewater	Potable, process and fire-fighting water supplies	Construction, Operation,	• Provision of process and fire-fighting water supplies from groundwater abstraction wells. Measures will be undertaken to prevent depletion and contamination of groundwater • Provision of potable water from contractor • Provision of process water for gas pipeline from nearby water bodies to be agreed with local water department
	Generation of sanitary wastewater	Construction, Operation,	• Construction – Use of mobile eco-toilets and transfer of wastewater off site by Third party contractors • Operation – Treatment of wastewater in WWTP for re-injection or re-use or transfer of wastewater off site by Third party contractors

	Generation of process wastewater	Construction, Operation,	• Construction – Transfer of off site by Third party contractor or treatment in WWTP at Oil Terminal • Operation – Treatment in WWTP and sent to water re-injection plant or reused in systems • Construction of pipeline – pre-cleaning of pipeline with compressed air and hydrostatic waste water to be filtered before discharge into filtration fields for evaporation
	Generation of rain/storm water	Construction, Operation,	• Construction – Infiltration into ground or transfer into existing systems at OTU or Oil Terminal • Operation – Transfer into rain/storm water system
Biodiversity	Disturbance to local fauna and flora	Construction, Operation,	No mitigation planned
Landscape	Changes to local landscape	Construction	No mitigation planned
Hazardous Materials Handling / Storage	Spillages to unsealed ground resulting in ground contamination and occupational health and safety hazard	Construction, Operation,	• Substances to be appropriately labelled and stored in secure, covered areas on unsealed ground with adequate bunding/secondary containment • Provision of drip trays, spill response kits/training and emergency procedures • Drainage point protection
Noise	Elevated levels of noise from pipeline construction equipment	Construction	• Machinery will be fitted with effective silencers where available and all equipment will be kept in good working order • Appropriately trained personnel will undertake regular and effective maintenance of both fixed and mobile plant. • The need to minimise noise will be emphasised through training of site personnel
	Elevated personal noise exposure limits in GTP	Operation	• Turbines in noise attenuation enclosures, silencers at air intake and exhaust points • Annual personal exposure monitoring
Socio-Economic	Labour and working conditions	Operation	Establish and implement an official grievance procedure and a written non-discrimination and equal opportunities policy
	Increased tax collection by local, county and national government	Operation	No mitigation planned

	Increased employment and revenue to goods/services providers	Construction	No mitigation planned
	Increased supply of LPG and Gas to the local and national market	Operation	No mitigation planned
	Disturbance of archaeological remains particularly during ground excavation activities	Construction	Implementation of procedure for identifying and protecting archaeological artefacts

9 CONCLUSIONS AND RECOMMENDATIONS

An Environmental and Social Action plan (ESAP) has been developed which incorporates the Environmental and Health and Safety conclusions and recommendations of the Environmental Audit of current operations and Environmental Analysis of planned expansions. As part of this action plan AMEC has recommended that Zhaikmunai submit an Annual Environmental, Health and Safety Report to the EBRD which will allow identification of actions that have been undertaken and those that are still outstanding. The ESAP is presented below.

10 ENVIRONMENTAL AND SOCIAL ACTION PLAN (ESAP)

No	Action	Environmental Risks, Liability/Benefits	Applicable Legislation / Best Practice	Investment Needs/ Resources Costs	Deadline	EBRD Deliverables
Environmental Audit of Current Operations						
1	Undertake an Annual Environmental, Health & Safety and Social Management Report which will be provided to the EBRD to report on any issues and progress.	Will provide a clear illustration of performance of Zhaikmunai in relation to Environmental, Health and Safety and Social management	Best Practice	Management Time	Annual	Annual Report on Environmental, Health and Safety and Social management (EHS)
2	Construction of a secure perimeter fence at all Zhaikmunai operational facilities at the Chinarevskoye Field, as at present not all operational facilities are enclosed by a secure perimeter fence.	To prevent harm to any persons or animals that comes across facilities and to prevent accidental damage to facilities.	Environmental, Health, and Safety Guidelines – Onshore Oil and Gas Development, IFC	Costs for equipment/ installation & Management Time	End of 2009	Report progress, with photographic evidence of fencing installed at each well in Annual EHS Report
3	Chemicals stored in the cold storage warehouse did not have appropriate secondary containment. It is therefore necessary to construct a robust method of secondary containment for chemicals stored on site, such as a 6-12" concrete lip/bund around the warehouse perimeter or inside the warehouse.	Ensuring the mitigation of adverse effects on soil/groundwater quality	EU BREF; Emissions from Storage (07.2006)	Costs for protective measures/ devices Management Time	End of August 2009	Report progress, with photographic evidence in Annual EHS Report
4	Several containers for oxygen canisters were not adequately secured. It is therefore necessary to provide lockable containers	Ensuring the mitigation of adverse effects on workers H&S and on soil/groundwater quality.	Environmental, Health, and Safety Guidelines –, IFC	Costs for protective measures/ devices Management	End of August 2009	Report progress, with photographic evidence in Annual EHS Report

No	Action	Environmental Risks, Liability/Benefits	Applicable Legislation / Best Practice	Investment Needs/ Resources Costs	Deadline	EBRD Deliverables
	for oxygen canisters or mend those currently in use.			Time		
5	Large quantities of demulsifying agent were stored out in the open. It is therefore recommended that the demulsifying agent is stored in an adequate storage facility, such as one of the cold storage warehouses or a new storage area to be provided.	Ensuring the mitigation of adverse effects on soil/groundwater quality	Environmental, Health, and Safety Guidelines –, IFC	Costs for protective measures/ devices Management Time	End of 2009	Report progress, with photographic evidence in Annual EHS Report
6	Domestic waste is stored in open containers around the site and it is recommended to purchase secure and covered storage skips for domestic waste	Ensure storage of waste complies with requirements	Environmental, Health, and Safety Guidelines –, IFC	Costs for equipment/ Management Time	End of August 2009	Report progress, with photographic evidence in Annual EHS Report
7	Zhaikmunai's permit for storage of drilling waste in hydro-isolated pits expires in December 2010. It will therefore be necessary to construct a temporary storage polygon for drilling waste if another more suitable method of disposal cannot be found.	Ensuring the mitigation of adverse effects on soil and groundwater quality	Environmental permits of RoK	Costs for protective measures/ devices Management Time	December 2010	Report progress, with photographic evidence in Annual EHS Report
8	There has not been a radioactive waste survey at Zhaikmunai facilities since 2006 and employee radiation exposure monitoring has not been undertaken. It is therefore necessary to complete a radioactive waste Survey and employee	Ensuring the mitigation of adverse effects on workers H&S and on soil and groundwater quality	Environmental Code of RoK and Environmental, Health, and Safety Guidelines –, IFC	Survey Costs/ Management Time	End of 2009	Provide details and results of survey in Annual EHS Report

No	Action	Environmental Risks, Liability/Benefits	Applicable Legislation / Best Practice	Investment Needs/ Resources Costs	Deadline	EBRD Deliverables
	radiation exposure monitoring					
9	A violation was noted in the MEP inspection in 2009 for mixing of hazardous and domestic waste. Zhaikmunai is recommended to purchase dedicated storage containers for each category of hazardous waste to prevent this in future	Ensure no mixing of waste occurs and ensure the mitigation of adverse effects on soil/groundwater quality	Environmental, Health, and Safety Guidelines –, IFC	Costs for equipment/ Management Time	End of August 2009	Report progress, with photographic evidence in Annual EHS Report
10	Zhaikmunai does not currently maintain a spill register. This is therefore recommended.	Ensure spills are identified and ensure the mitigation of adverse effects on soil and groundwater quality	Best Practice	Management Time	End of 2009	Include completed register in Annual EHS Report
11	Zhaikmunai do not currently maintain a H&S register of all near misses and it is therefore recommended that this is maintained.	Used to improve health and safety culture and climate and prevent future incidents accidents	Best Practice	Management Time	End of 2009	Include completed register in Annual EHS Report
12	Establishment of a grievance and non-discrimination procedure for employees, as Zhaikmunai do not currently have these procedures in place.	Ensure employee wellbeing	EBRD 2008	Management Time	End of 2009	Include procedures in Annual EHS Report
13	Undertake a survey of all transformer fluids in order to develop a PCB inventory for Zhaikmunai facilities.	Ensuring the mitigation of adverse effects on workers H&S and soil and groundwater quality	Best Practice	Survey Costs/ Management Time	End of 2009	Provide details and results of survey and inventory in Annual Report
14	Undertake a survey of all A/C units in order to develop an ODS inventory for Zhaikmunai facilities.	Ensuring the mitigation of adverse effects on workers H&S and soil and groundwater quality	Best Practice	Survey Costs/ Management Time	End of 2009	Provide details and results of survey and inventory in Annual EHS Report
Environmental Analysis of Planned Expansions						
15	Preparation of a stakeholder engagement plan for all planned expansions which	Allow communication with target stakeholders about proposed projects. Allow	Best Practice	Management time	At least 6months in advance of construction of all	Provide stakeholder engagement plan

No	Action	Environmental Risks, Liability/Benefits	Applicable Legislation / Best Practice	Investment Needs/ Resources Costs	Deadline	EBRD Deliverables
	will include details of: Planned media advertising for all new projects; Planned public hearings for all new projects, including planned locations and attendees; and Details of a grievance procedure for the public, which will allow identification of objections or complaints about the project.	communication of any grievances held by public concerning new projects.			planned expansions.	
16	Removal and storage of fertile top soil and subsoil horizons for reuse is advised during the construction stage for all planned expansions.	Prevent loss of fertile agricultural soil	Environmental Code of RoK	Management time	During Construction	Photographic evidence in Annual EHS Report
17	Re-instatement of soil and Rehabilitation of construction areas of all planned expansions to be restored as far as possible to the pre-existing condition of land.	Prevent soil erosion and loss of fertile agricultural soil	Environmental Code of RoK	Management time	After construction	Report status in Annual EHS Report
18	Undertake baseline soil and groundwater monitoring and follow on monitoring throughout the Project life of all planned expansions for annual soil and groundwater quality monitoring.	Annual monitoring data to be compared against baseline conditions in order to assess impact of current Site activities on soil and groundwater quality	Environmental Code of RoK	Management time Expert fees Sampling and analysis costs	Baseline monitoring to be completed at the start of construction or operation, whichever is possible. Follow-on monitoring to be done on an annual basis	Baseline and Annual soil and groundwater monitoring reports
19	Hazardous materials are to be appropriately stored, (characterised and labelled) over sealed surfaces in secure and covered locations with adequate bunding at all planned expansions.	Ensuring the mitigation of adverse effects on workers H&S and on soil/groundwater quality	Best Practice (World Bank Group EHS Guidelines);	Costs for protective measures/ devices Management Time	During Construction and operations	Photographic evidence in Annual EHS Report
20	Presence of spill response	Ensuring the mitigation of	Best Practice (World	Costs for	During	Evidence in Annual

No	Action	Environmental Risks, Liability/Benefits	Applicable Legislation / Best Practice	Investment Needs/ Resources Costs	Deadline	EBRD Deliverables
	kits, vehicle drip trays, dedicated re-fuelling area and appropriate training of personnel in spill response techniques at all planned expansions.	adverse effects on workers H&S and on soil/groundwater quality	Bank Group EHS Guidelines);	protective measures/ devices Management Time	Construction and operations	EHS Report
21	Annual ambient and point source air monitoring programmes should be implemented for the extension to the OTU, the GTP and the LPG Terminal at the facilities and borders and near any sensitive receptors	Cumulative impact assessment of all the air emission sources	Environmental Code of RoK	Management time Expert fees Sampling and analysis costs	Quarterly	Annual air emissions report
22	Preparation, implementation and monitoring of a Water Management Plan for all planned expansions which will include details of: - raw water supply, - raw water quality/flow monitoring/metering, - waste water discharge locations/methods, - waste water quality/flow monitoring/metering.	Ensuring the mitigation of adverse effects on water quality	Best Practice (World Bank Group EHS Guidelines);	Management Time	Annual	Water Management Plan Annual reports on water and wastewater management
23	Spread of 15km gas pipeline will be clearly marked and there will be on going maintenance of the pipeline.	Maintenance of Industrial Safety	Trunk Pipeline Protection Rules (KZ RD PL) Best Practice (World Bank Group EHS Guidelines)	Management Time	Ongoing	Status in Annual EHS Report
24	The running track of the 15km gas pipeline will be on subsoil or stone or bog mat. It is recommended that monthly inspections of the pipeline route are undertaken to ensure that reinstatement of soil remains effective.	Prevent soil erosion and loss of fertile agricultural soil	Trunk Pipeline Protection Rules (KZ RD PL) Best Practice (World Bank Group EHS Guidelines)	Management Time	During Construction	Status in Annual EHS Report

No	Action	Environmental Risks, Liability/Benefits	Applicable Legislation / Best Practice	Investment Needs/ Resources Costs	Deadline	EBRD Deliverables
25	A Flora and Fauna survey should be undertaken along the length of the 15km gas pipeline.	Prevent impacts to local flora and fauna	Environmental Code of RoK	Management time Expert fees	Before construction if not already completed	Results in Annual EHS Report
26	A chance finds procedure for archaeological remains at any of the planned expansions should be put in place.	Prevents impacts to any archaeological finds	Best Practice	Management time Expert Fees	During Construction	Procedure and status in Annual EHS Report

ZHAIKMUNAI

Zhaikmunai LP, Clinch's House, Lord Street
Douglas, Isle of Man, IM99 1RZ
Tel +44 1624 682179 | Fax +44 1624 691784
info@zhaikmunai.com | www.zhaikmunai.com