AEA

Lenders' Independent Environmental Consultant Site Visit Report: September 2008

Sakhalin II (Phase 2) Project

Report to Sakhalin II (Phase 2) Project Finance Parties

Restricted – Commercial
AEAT/ENV/R/2704 Issue 2
October 2008

Title	Lenders' Independent Environmental Consultant Site Visit Report: September 2008. Sakhalin II (Phase 2) Project
Customer	Sakhalin II (Phase 2) Project Finance Parties
Customer reference	Y-04287
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File reference	ED45224
Reference number	AEA/ENV/R/2704 Issue 2

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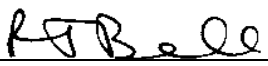
	Signature	
	Date	13/11/09

List of Abbreviations

DLN	Dry Low NO_x
IEC	Independent Environmental Consultant
LNG	Liquefied Natural Gas
OPF	Onshore Processing Facility
PMD	Project Maintenance Depot
RemAP	Remedial Action Plan
RFSU	Ready For Start-Up
RoW	Right of Way
SPZ	Sanitary Protection Zone
WUL	Water Use Licence

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Appendices

1 Introduction

AEA Technology (AEA) is the Independent Environmental Consultant (IEC) acting on behalf of the lenders to the Sakhalin II Phase 2 project (the 'Project'). Under the Terms of Reference (ToR) of our engagement as the IEC, AEA and Lender representatives undertake periodic site monitoring visits to the Project. This report presents the findings of the site visit undertaken between the 17th and 26th of September 2008. The primary focus of the site visit was to assess progress made on reinstatement of the pipeline RoW, and in particular progress made against the Remediation Action Plan (RemAP) for Rivers, Erosion Control and Reinstatement & Wetlands developed by Sakhalin Energy Investment Company Ltd. (Sakhalin Energy) in response to non-compliance issues previously raised by AEA during the construction period (see AEA's Final IEC report to Agency Lenders, AEA/ENV/R/1376[1]). This focus is reflected in the extensive number of locations on the pipeline RoW inspected during the site visit across all construction Sections (Section 1A to Section 4). The full list of locations visited is provided in Appendix 1.

In addition to review of pipeline RoW progress, the September 2008 site visit also addressed:

- Inspection of waste management facilities
- Inspection of pipeline construction camps
- High-level review of the Onshore Processing Facility (OPF)
- High-level review of the Liquefied Natural Gas (LNG) site and associated construction camp

We note that the site visit was not intended to act as a detailed audit of the OPF or LNG sites and such audits of these facilities will be the subject of future site visits. We also note that the September 2008 site visit focussed on environmental aspects and that social issues will be addressed during future site visits.

[1] Sakhalin II Phase 2 Project Health, Safety, Environmental and Social Review; Independent Environmental Consultant Final Report – Agency Lenders; September 2007. Available from the Sakhalin Energy Investment Company Ltd. website: http://www.sakhalinenergy.com/en/library.asp?p=lib_sel_iecddr2007

2 Onshore Pipelines

2.1 Overview of Field Observations

2.1.1 General Reinstatement Works

AEA inspected a range of locations along the pipeline right of way (RoW) during the site visit (see Appendix 1 for full list). The sites were identified by AEA, with a particular focus on key risk areas such as steep slopes and sensitive rivers, on the basis of experience gained during previous field monitoring; AEA has undertaken extensive field monitoring since 2003 (see AEA report AEA/ENV/R/1376 for full details) with the two most recent previous monitoring trips being undertaken in November 2007 and June 2008. The sites visited are listed in Appendix 1 and were selected in order to judge progress made at a representative cross-section of the RoW on:

- Temporary erosion controls
- Permanent reinstatement of the RoW (including wetlands)
- Reinstatement of riverbanks.

Overall, a generally favourable impression was gained of the quality of erosion control and reinstatement works in place at the time of the site visit. In particular, significant improvements were identified over previous site visits with respect to:

- Drainage controls
- Surface stabilisation
- Slope stabilisation and profiling
- Riverbanks reinstatement.

Each of these areas is discussed in further detail below.

- **Drainage controls.**
  Drainage controls have been implemented in the form of slope breakers and spoon drains at a wide range of locations on the RoW. The drainage controls were identified as being installed at the necessary locations, with very few exceptions. The design of drainage controls was also found to be of a generally good standard, although some areas for (relatively minor) improvement were also identified. Some specifics of drainage control are discussed in turn below:
    - The frequency of spacing of slope breakers was generally found to be adequate (e.g. see Picture 1). However, a number of locations were identified where additional slopes breakers would be beneficial to both reduce rilling on the slopes and reduce the volume/energy of runoff water handled by the slope breakers (e.g. the north slope of the R. Kirpinchnaya, R. Korsakovka and KP458 – see Picture 2). These are not of significant concern at the current time and can be readily rectified.
    - The majority of drainage controls were identified as being armoured by either geotextile (for slope breakers – e.g. see Picture 1) or rip-rap (for spoon and French drains – e.g. see Picture 3).
    - In many areas slope breakers have been installed across the RoW and are designed to be drivable where they cross the running track (in some areas the geotextile is temporarily rolled back from the running tracking to allow access while not damaging the textile). This represents an important improvement over practices previously witnessed by AEA, although in some areas drainage controls will need to be extended across the entire width of the RoW once the running track is removed (e.g. see Picture 2).
    - The depth and gradient of the slope breakers is typically much improved in order to direct water off the RoW in a suitably low-energy state (e.g. Picture 1). However, some exceptions were identified where the existing drainage controls have been designed rather steeply (e.g.

see Picture 4) and these require re-design for final reinstatement in order to avoid erosion at the drainage outlets.

- The location and design of drainage outfalls were identified to be generally adequate, although a number of locations were noted where further engineering is required to minimise the risks of erosion into the RoW, especially where drainage channels are directed towards steep slopes at the side of the RoW. Examples of this include the southern slopes of the R. Kormovaya, where, although riprap has been installed at the outfall, additional engineering may be required, and near the R. Pegus, where the lack of energy-dissipation at the end of some drainage channels is leading to minor erosion (see Picture 5).

- **Surface stabilisation.**
  Improvements to surface stabilisation on slopes along the RoW have been made through increased use of geotextiles and progress made with seeding. Significant seeding was seen to have occurred, although at the time of the visit the extent of re-vegetation varied significantly along the RoW, reflecting the timing when the seeding occurred and the lack of topsoil in some areas. We note that even where broadcast seed has yet to germinate, the presence of seed during next spring will help with re-vegetation in 2009. Areas where re-vegetation has occurred most successfully are those where the soil is particularly fertile (and re-vegetation has occurred naturally – e.g. see Picture 6) and where hydroseeding has been undertaken (e.g. around faults – e.g. see Picture 7). The use of geotextile to aid surface stabilisation prior to biological reinstatement was identified at a number of sites to good effect. This acts as a key for seed, helping to avoid wash-off. We suggest that geotextile should be used for winterisation in Section 3B (see Section 2.2 below).

- **Slope stabilisation and contouring.**
  Work is currently progressing on the stabilisation of slopes and side-cuts along the RoW and some good examples of engineering have been identified, e.g. around the Nzihni Kamyshovka and at KP101.5 in Section 1B (see below and Picture 9), which were both previously highlighted by AEA as risk areas requiring additional works. With regard to some of the more challenging slopes (predominantly located in Section 3B), additional works are required and detailed designs are yet to be implemented in some key slopes (e.g. near the R. Krinka and the R. Kormovaya). These areas are discussed further in Section 2.2.1.

- **Riverbanks reinstatement.**
  Permanent reinstatement works on riverbanks have been ongoing in 2008, with all engineering works required under the water use licences (WULs) needing to be completed before first oil in the pipe[2]. This has been completed in the northern pipelines sections where gas was in the pipe at the time of the site visit in preparation for the introduction of oil. First oil in the pipeline is due by mid-October 2008 and hence remaining riverbank reinstatement is to be completed by that time. The standard of engineering works undertaken on riverbanks is somewhat variable between the different subcontractors. In some areas work performed by specialist contractors to install Reno mattresses and gabion defences on eroding riverbanks has been identified as being of a high standard (numerous examples of good work include those at the R. Pegus, R. Madera, R. Pobedinka, R. Pulka and R. Varvarka – see also Picture 3). Elsewhere Reno mattress construction by non-specialist contractors is of a sometimes lower quality (e.g. inadequate toe-in with the riverbank), although we note inspection by Sakhalin Energy's geotechnical specialists will be undertaken prior to final sign-off. In many instances the need for hard-reinstatement of riverbanks is questionable from a technical viewpoint, but necessary under the conditions of the WULs. In some instances naturally re-vegetated and stabilised riverbanks are being re-worked, with resultant re-disturbance of the river in order to meet the WUL requirements for Reno mattress protection. AEA views this as unfortunate but recognises that this is a permit requirement. Some care is required in the programming of the works in order to minimise the time between the removal of temporary riverbank protection and the installation of permanent protection, particularly at a time of year when heavy rainfall can be expected (see Picture 8).

[2] This is known by Sakhalin Energy as Ready For Start-Up (RFSU)

To illustrate the general improvements made over time we present below chronological changes at the following representative locations:

- **KP 101.5, Section 1B**
  During previous site visits to this area (e.g. May 2006 and November 2007) AEA identified concerns with erosion of the side of the RoW that, if not rectified, could pose a risk to the pipeline. During the September 2008 site visit we found that the area has been subject to significant geo-technical engineering and biological reinstatement works, including
  - re-profiling of the slopes
  - installation of gabion supports
  - installation of armoured drainage channels and slope breakers
  - surface stabilisation through application of geotextile and hydroseeding.

  The works appeared from visual inspection to be of good quality (although ongoing monitoring of the performance of the geotechnical solutions will need to be undertaken by SAKHALIN ENERGY – see Section 2.2 below). The greatly improved status of the site in September 2008 is contrasted with the situation viewed by AEA in November 2007 in Picture 9.

- **Vicinity of KP127 - sandy slopes in Section 2**
  The area around KP127 in Section 2 is characterised by rolling slopes and sandy soils of low fertility. The lack of preservation of the thin topsoil layers during construction means that biological reinstatement is problematic. In addition, AEA identified concerns over erosion controls (e.g. lack of slope breakers and poor drainage controls leading to visible sediment flows) in the area during previous site visits, for example during 2007. Significant improvements were identified during the September 2008 site visit. A comparison of the site status between May 2007 and September 2008 is shown in Picture 10 and illustrates improvements to drainage controls (avoiding the sediment flows seen in May 2007), the installation of slope breakers, stabilisation of side cuts and the use of geotextile with seeding to promote re-vegetation.

- **KP211.5 R. Pobedinka Section 2**
  The southern slope adjacent to the R. Pobedinka is affected by subsurface groundwater flows that have been identified as leading to slope erosion during previous site visits. In addition, the southern riverbank at the foot of this slope is on an eroding bend in the river and failures of previous bank engineering (Reno mattresses) were identified, for example in 2006. By the time of the September 2008 site visit the permanent engineering solution for this slope had been implemented and the riverbank/slope is now protected by a 2-tier gabion wall. Visual inspection indicated the works to be of good quality and a major improvement over previous works, as illustrated in Picture 11. We note however, that the engineering works are restricted to within the limits of the RoW as land allocation for works beyond this area has not been sought. In this case, natural erosion of the southern riverbank occurs immediately outside of the RoW and poses the potential risk of eroding behind the gabion wall. This general issue is discussed further in Section 2.2. There was a small amount of ponding noted behind the gabion wall during the visit. This will need to be rectified with some minor drainage works prior to the snowmelt in spring to ensure that there is no unnecessary pressure build-up (see Picture 12).

- **Varvarka Valley Section 3**
  In the Varvarka valley the R. Varvarka and its tributaries run adjacent to and across the RoW. This results in a number of geological complications, including potential stream erosion into the side of the RoW and stability of side-cuts within the valley. During previous site visits AEA has raised concerns over the management of these risks. However, by the time of the September 2008 site visit significant engineering works had been performed in the valley based on detailed designs. These include the application of slope breakers (with geotextile protection), gabion channelling of the river and tributary streams to prevent erosion into the RoW, terracing and drainage control on side cuts, and seeding. Examples of these works are shown in Picture 1 and Picture 3, with a comparison of the current status with previous site visits being shown in Picture 13.

2.1.2 Wetlands

Disturbance to wetland flows has previously been identified by AEA at a small number of wetland areas, including visible pooling where the running track was seen to be disrupting the hydrological flows in:

- Wetland areas between KP212 to KP220.
- Wetland areas in the vicinity of the R. Leonidovka basin (KP269 to KP277).

These sites were also identified for remedial works in the RemAP. In winter 2007/08, remedial works were undertaken in the area KP212-220 to remove the running track. During the September 2008 visit, access to the entire area was not possible due to ground conditions. However, in the areas accessible (in the north portions), AEA found the wetlands to be recovering well, suggesting that the remedial works had been successful. In particular, the previously identified pooling was no longer visible and this change is illustrated in Picture 14, which shows the area as photographed in May 2006 and in September 2008.

Remedial works to remove the running track from the Leonidovka basin wetlands had yet to be performed at the time of the September 2008 site visit, as access was still required to the various branches of the Leonidovka to install riverbank Reno mattress as per the WUL in preparation for RFSU. During the site visit, good natural re-vegetation of the RoW either side of the running track was witnessed. We recommend that when the running track is removed, every effort should be made to avoid disturbance of the re-vegetated areas. As a more general point, we note that natural re-vegetation has occurred in many wetland (and indeed non-wetland) areas that have yet to be technically reinstated. If full levelling across the RoW is undertaken as part of final technical reinstatement then the re-vegetation that has already occurred will be lost, thus extending the overall period of disturbance. We recommend that site-specific assessment be made of all areas showing strong natural re-vegetation and that further levelling activities are only undertaken where technically necessary (e.g. removal of proud crowns over the pipelines or filling in of pits over the pipelines).

2.2 Progress Against the Remedial Action Plan

2.2.1 Introduction

Significant improvements in reinstatement and erosion controls on the pipeline RoW were identified during the September 2008 site visit, as discussed above. However, we note that the rate of progress on reinstatement will not meet the RemAP target to complete all reinstatement of the RoW by end of 2008. We discuss the specific aspects of technical reinstatement, biological reinstatement, wetlands and riverbanks in the following sub-sections, including overviews of the progress made to date. We recommend that, in the light of the actual progress made, Sakhalin Energy provides an update on the RemAP (for example as part of the monthly RemAP report) including:

- The progress made by the end of 2008 (in terms of areas signed off by Sakhalin Energy as RFSU, technically reinstated, and biologically reinstated)
- A realistic plan and timetable for completion of technical and biological reinstatement (including success criteria) prior to the spring thaw of 2009.

2.2.2 Technical Reinstatement and Winterisation of the RoW

Information provided by Sakhalin Energy on the progress made as of 5th September 2008 on technical reinstatement of the RoW is summarised in the table below, together with their medium-range estimate for progress by the end of 2008.

Table 1 Technical Reinstatement Progress and 2008 Completion Prediction (Sakhalin Energy Data)

Section	Scope (km)	Completed (per cent of scope)	
		Completed 5/9/2008	Predicted by end 2008
1A	56.8	84.2	100
1B	101.4	41.9	78
1Cd	6.9	0	50
1C	93	63.2	100
2	174.3	51.9	89
3	159.4	42.8	69
4	191.7	67.5	100
Total	**783.5**	**55.8**	**88**

The above table indicates that the just over half of the RoW was technically reinstated by 5th September 2008, although it is not clear from the available data what proportion of this has been formally signed off as completed final reinstatement by Sakhalin Energy (as opposed to completion as reported by the construction contractor). At the time of the site visit Sakhalin Energy was optimistic that around 90% of the technical reinstatement will be completed by the end of 2008. This is achievable, although we note that the actual progress will be somewhat dependent on weather conditions in November and the onset of winter.

It is also important to note that some of the higher erosion risk areas in Section 3 are among those where final technical reinstatement will not be completed in 2008 (these include some slopes, such as those near the R. Kormovaya, R Krinka etc., where detailed reinstatement designs are required). In these cases, temporary winterisation will need to be completed. While we acknowledge the improvements made in temporary erosion controls, we note that on these steep slopes temporary erosion controls cannot guarantee full protection against the spring thaw, especially if there is heavy snow fall in winter 2008/09 (although we note that the additional use of geotextile on these slopes may nonetheless help in reducing erosion).

We also note the time pressure under which remaining winterisation works in Section 3 are to be undertaken. This may be complicated by the focus on activities to achieve RFSU by mid-October and after RFSU (when oil will be in the pipeline) the need for permit-to-work approvals for winterisation works on the RoW. Progress on winterisation will be re-assessed by AEA during a follow-up site visit planned for November 2008.

2.2.3 Biological Reinstatement

Although biological reinstatement was not included in detail in the RemAP, it was stated in the RemAP that Sakhalin Energy aimed to complete biological reinstatement by the end of 2008. Information provided by Sakhalin Energy on the progress made as of 5th September 2008 on biological reinstatement of the RoW is summarised in the table below, together with their medium-range estimate for progress by the end of 2008.

Table 2 Biological Reinstatement Progress and 2008 Completion Prediction[3]

Section	Scope (km)	Completed (per cent of scope)	
		Completed 5/9/2008	Predicted by end 2008
1A	46.3	68	100
1B	82.3	25	50
1Cd	4.3	0	100
1C	89.9	63	100
2	129.3	47	94
3	144.3	23	87
4	164.0	59	100
Total	**660.4**	**50**	**89**

[3] According to SEIC data 123km of the RoW does not requiring seeding in 2008 due to successful seeding in 2007, wetlands, natural colonisation etc

This data indicates that Sakhalin Energy aims to have undertaken biological reinstatement over the majority (approximately 89%) of the (non-wetland) RoW, where seeding is required (see footnote 3, by the end of 2008. We note that these data refer to areas where seeding has been undertaken in 2008 and ongoing review of the success of this seeding in terms of actual re-vegetation will be required by Sakhalin Energy (including the development of re-vegetation success criteria).

While field inspections undertaken during the September 2008 site visit indicate that significant seeding has taken place along the RoW, the extent of actual re-vegetation varied significantly along the RoW, reflecting the timing when the seeding occurred and the lack of topsoil in some areas. We note that in certain areas, especially where soil fertility is low and original topsoil has been lost, successful biological reinstatement may be a longer term and iterative process. In such cases solutions to aid re-vegetation, such as the use of mulches, different fertiliser mixes and geotextile may need to be experimented with. Given the timeframe over which this is likely to occur, it is important that capability and knowledge of the RoW reinstatement issues is successfully transferred from the construction team to the operational team. We recommend that Sakhalin Energy develops specific plans to ensure that this happens during the 2009 handover period.

2.2.4 Wetlands

One of the main potential impacts to wetlands from the construction of the pipeline has been the installation of temporary access roads and running track. As part of the RemAP, an assessment was required, *inter alia,* to identify:

1. Where permanent roads/running track are required for operational maintenance
2. The design for permanent access roads/running track in wetlands to ensure no longer term impacts on the functioning of the wetland hydrology
3. The best approach for removal of temporary roads/running track not required for operational maintenance (it is recognised in the RemAP that in some instances removal may not be possible or could lead to greater impacts than leaving in situ).

Following these assessments, a wetlands remediation plan was to be developed. This was originally due for completion in 2007, but delays meant that it was not completed until September 2008. This plan will be reviewed by AEA on behalf of Lenders shortly. We understand from discussions with Sakhalin Energy personnel that final decisions on all permanent access requirements have not yet been made although elevated plank roads are being removed in locations where it has been determined they are no longer required.

2.2.5 Riverbank reinstatement

Under the RemAP, reinstatement of the riverbanks was due to be completed by the end of 2008 and this appears to be being achieved, with the riverbanks being engineered in accordance with WUL requirement prior to RFSU in mid-October. Commentary on the quality of the riverbank engineering works observed during the September 2008 site visit are discussed in Section 2.1 above, while future maintenance issues associated with these works are discussed in Section 2.3 below.

2.3 Future Maintenance

Geotechnical engineering works are being developed as necessary by Sakhalin Energy at a wide range of locations, including numerous riverbanks, fault crossings, steep slopes, sides-cuts and subsurface flow locations. Where deemed necessary, site-specific detailed engineering designs have been developed by geotechnical engineers. Review of these engineering designs is out side of the scope of AEA in its role as IEC, and is addressed by the lenders' Independent Technical Consultant. Nonetheless, on the basis of visual inspections undertaken by AEA during the September 2008 site visit, we make the following general observations.

Visual inspection of the engineering works installed to date reveals a generally high standard of work (notwithstanding minor concerns identified in Section 2.2.5 regarding some riverbanks). However,

given the nature of the geological hazards posed in some portions of the RoW, ongoing monitoring of the performance and condition of the installed engineering solutions will be required throughout the lifetime of the project. It is to be expected that monitoring over time may reveal that the engineering works at certain sites need to be repaired or upgraded to ensure ongoing protection of the pipeline against geological processes. Following the September 2008 site visit, we identify a number of generic areas where the need for future re-working of geotechnical engineering may be particularly likely:

- The outfalls on drainage channels may require further stabilisation and energy dissipation. This is particularly likely where drainage channels discharge to steep slopes adjacent to the RoW (e.g. where the pipeline runs along erodible hill ridges), with the associated risk of erosion into the side of the RoW.
- Rivers where significantly eroding banks lie immediately outside of the RoW with the risk that the river erodes behind the existing engineering within the RoW. Examples of where this may occur include the R.Pobedinka (see Picture 15), R. Nitui and the R. Kirpichnaya (see Picture 16). In such instances we recommend that Sakhalin Energy continue to monitor the channel erosion and, if necessary, consider the need to seek additional land allocation to enable installation of engineering outside of the current RoW.
- In some locations on the RoW steep side cuts have been developed where the RoW has been contoured (see for example on slopes adjacent to the R. Gar as shown in Picture 17). In such cases the side cuts have not been feathered back to more stable angles due to the additional land allocation that this would require. The future stability of these side cuts needs to be monitored and, if necessary, additional engineered solutions implemented (including consideration of seeking additional land allocation if appropriate).

The need for future monitoring and management of these risks is recognised by Sakhalin Energy and the Company is currently developing a geological risk register and inspection schedule. We understand that the first drafts of these documents are prepared and being subject to expert review. In order to ensure that these issues are successfully managed as the project moves into the operational phase, it is important that existing capability and site-specific knowledge of the RoW is successfully transferred from the construction team to operational team. This would ideally include retention of key construction staff during a cross-over period.

3 Onshore Processing Facility

The visit to the OPF involved a high level walkover audit was carried out of known potential problem areas as identified during previous site visits. A more detailed audit is planned for later in 2008 to assess items in more detail and also look at other areas and aspects not addressed during the September 2008 visit (e.g. air emissions, camp facilities, conversion of the turbines from diesel to gas, disposal wells, etc).

3.1 Waste Transit Area

There has been a great improvement in the running and record keeping for this area with good waste segregation and recording. The bulk wastes of wood, metals and general trash are stored in separate bays. The trash goes to Nogliki landfill and the metal goes to Yuzhno for recycling. There is on-going negotiation over gifting the wood for use in the local community. There are tax implications associated with proposed gifting, but it is hoped that these will be resolved soon.

Hazardous wastes are stored in separate metal storage containers and records held by the environment team as to type and quantity. There is a contract in place with Ecoshelf to collect and dispose of the wastes although Sakhalin Energy pay to store wastes while they are held at OPF. This payment liability moves to Ecoshelf when they collect. Ecoshelf undertake the final disposal of the wastes and arrange for the paperwork to be returned to Sakhalin Energy to complete their records. During this visit it was noted that there was a disconnect between the records held at the OPF and the final records of disposal owing to the fact that central HSE in Yuznho hold the contract with Ecoshelf and so receive all the paperwork back. These records are then supposed to be distributed out to the facilities to close the waste trail loop and provide an auditable trail, but at the time of the visit this loop had not been closed. This may have been due to an accident of timing, as the records held in both Yuzhno and the OPF appeared to be good. A further, more thorough, audit of the records will be carried out to confirm whether or not the system is working.

A new waste transit area is being constructed for chemical wastes and should be in operation in 2009.

3.2 Sewage Treatment Works

The sewage treatment system was inspected and found to be in good condition with staff that are well trained and know the operation well. There are still problems with the system meeting the standard set for nitrate but this is likely to be due to the overloading of the capacity – the system is designed for 5,000 people and has regularly had to treat effluent from 7,000 people. This should reduce as the construction workforce demobilises. A more thorough audit of the monitoring records will be carried out to further assess whether there has been any impact on the local environment due to these exceedences. There are plans for a new sewage treatment plant to replace the existing one once the OPF facility is fully functional.

3.3 Data Collection, Storage and Analysis

The OPF HSES Compliance & Data Management Advisor maintains computer records of all the monitoring data for the site including the air, groundwater and waste records. These are used to monitor trends and produce the reporting required by both Sakhalin Energy and the regulator and seemed to fulfill the role adequately. However, it is planned that this system will be the subject of a more detailed audit by AEA later in 2008.

4 LNG Site

A high-level review of the LNG site was conducted during the September 2008 site visit, comprising:

- A brief site walkover of the LNG site and temporary facilities (not all areas of the LNG site were accessible due to safety restrictions owing to ongoing commissioning activities). Areas inspected during the site walkover included:
  - Temporary construction site camp (including kitchens, medical centre).
  - Temporary vehicle filling station
  - Temporary power generator site
  - Sewage treatment facilities (temporary camp and permanent facilities – these are of similar design and located adjacent to each other)
  - Site settling ponds
  - Temporary construction waste storage area
  - Permanent waste storage area
- Discussions with staff relating to:
  - Environmental management and transition from Construction to Operations teams
  - Decommissioning of temporary facilities
  - Flaring during commissioning

A more detailed follow-up audit of the site is planned for 2009.

4.1 Temporary Facilities

The workforce at the LNG is beginning to run down as construction nears completion. However, the future of the temporary camp is as yet unclear as the decision on the development of a third train at the site is still to be made. If a positive decision on constructing the third train is made then the temporary camp will be re-used. However, care will need to be taken to ensure that a sufficient proportion of the camp site falls outside of the LNG's SPZ during operation of trains 1 and 2. Sakhalin Energy is aware of this issue and air quality and noise monitoring will be required to confirm the boundary of the SPZ and hence the available area within the existing camp site.

Until a final decision on the third train is made, the temporary facilities will need to be mothballed. We recommend that a mothballing plan be developed. Decommissioning plans should also be developed for any construction facilities/utilities deemed not to be required. We note that visual inspection of some of the main temporary utilities (such as the temporary waste storage area, power generator facility, sewage treatment plant and vehicle filling station) revealed them to be in a good, clean condition with no visible evidence of land contamination. Nonetheless, prior to decommissioning of these facilities, soil and ground water monitoring will need to be undertaken and this should be included in a decommissioning plan (or mothballing plan if such facilities will not be required even if Train 3 construction goes ahead).

In addition, a demobilisation plan is required in order to best manage the termination of local employment. The development of such a plan is required under the HSESAP and is especially important at the LNG site where approximately 40% of the construction workforce are natives of Sakhalin.

4.2 Permanent Facilities

Many of the permanent facilities were not accessible during the site visit due to ongoing commissioning activities. However, the facilities that were visually inspected, including settling ponds, sewage treatments systems, waste storage areas, oil interceptors and drainage controls, were found to be well constructed and appropriate. The environmental management of the permanent facilities is

being aided by the implementation of a phased approach to the transfer of individual assets from the construction team to the operations team. This transition process is further assisted by the transfer of some construction staff to the operations team. A more detailed audit of the permanent facilities and their environmental management will be the subject of a more detail audited in 2009.

4.3 Commissioning Flaring

During the September 2008 site visit, discussions were held with the engineers regarding commissioning of the LNG plant and, in particular, associated flaring. Commissioning of the LNG plant has largely been undertaken using imported LNG. This has the advantage of limiting the amounts of lower fraction hydrocarbon being flared, hence reducing smoke generation and visual impacts from the flare. At the time of the site visit, the first of the LNG train Frame 7 generator/compressor sets was being commissioned (on imported LNG). The aim is to commission both Frame 7 compressors to operate in Dry Low NOx (DLN) mode prior to first gas. If realised this may enable a significant reduction in both overall NO_x emissions and flaring volumes during commissioning. This is because commissioning LNG compressors to operate in DLN has been problematical at other LNG sites and consequently led to system trips (and hence increased flaring) and compressors operating in higher NO_x emission mode (this would be particularly important at the Sakhalin Energy LNG site as the size of the SPZ is largely driven by NO_x emissions). It is therefore of potentially great benefit to commission the compressor in readiness for first gas.

Overall, we note that the commissioning process has the potential to reduce overall flaring during commissioning to below previous flaring estimates. We recommend that Sakhalin Energy update their flaring estimate in the light of current experience at the site in order to provide a more realistic assessment.

5 Waste Management

Under the HSESAP, Sakhalin Energy had undertaken a commitment to upgrade three landfills (Nogliki, Smirnikh and Korsakov) and provide funding or assistance with other landfills in use on the island that had been used by their contractors during the construction phase. The September 2008 visit gave the opportunity to briefly assess some of the facilities that Sakhalin Energy have been involved with. These are discussed below.

5.1 Upgraded Landfills

Under the HSESAP commitments, Sakhalin Energy upgraded three landfill facilities, namely those at Korsakov, Nogliki and Smirnikh. Each of these facilities was visited during the September 2008 trip and the findings are presented below. In addition, Sakhalin Energy confirmed during the site visit that an additional landfill, at Kholmsk, will also be upgraded utilising a similar design to that used at the other 3 upgraded landfills, with the existing landfill being closed (and capped). The upgraded landfill at Kholmsk will be used for both Sakhalin Energy and local municipal waste (using separate cells). This development is over-and-above the HSESAP commitments and represents a significant benefit to both the local environment and the local community. The Sakhalin Energy waste streams to be disposed at the upgraded Kholmsk landfill are those from the offshore platforms. These wastes are currently landed at Kholmsk port and then sent by road to the Korsakov landfill. Therefore the development of the Kholmsk landfill will also remove the need to transport the wastes from Kholmsk to Korsakov.

5.1.1 Korsakov Landfill

The upgraded landfill at Korsakov was in a clean and orderly condition at the time of the site visit. Little evidence of wind-blown waste was noted and the site is fully fenced (although the location and height of the fence could be improved to maximise protection against wind-blown wastes leaving the site). The original (pre-upgrade) cells have now been capped and gas vents installed.

The landfill appeared to be operated efficiently and well. During the site visit daily compaction (using sheepsfoot rollers) and coverage of waste was observed (using spoil from the pipeline construction together with course sand).

Records of wastes received appeared to be in good order, with daily logs used to record where each consignment of waste originated from, its classification, volume, and disposal location (termed ‘cards’) within the landfill. For Sakhalin Energy wastes, the manifest system was in operation and, for example, records for wastes from the LNG site were cross-checked by AEA to confirm that this system was functioning correctly.

5.1.2 Nogliki Landfill

Only a general view of Nogliki Landfill could be gained as the site was closing for the day. The site is fully fenced and has security, there are lined cells and the correct compaction and spreading equipment is in use. In general the site seemed tidy and well run (see Picture 18). It is understood that the original cell was increased in size through the addition of a lined bund to the original construction. This has had the effect of increasing the height of the waste mass which, while not ideal, is still better than the previous practices observed at the site in the past.

5.1.3 New Smirnikh Landfill

This is one of the up-graded landfills constructed by Sakhalin Energy in 2006 and replaced the former facility 2km away. There has now been an additional oily wastes handling area constructed at the site. This consists of a lined temporary holding cell and a large bio-remediation area equipped with a groundwater monitoring and pumping well that can extract the oily water and run it through an on-site treatment plant (see Picture 19). It was not clear from the site visit exactly how the system was

designed to work and on further enquiry it became apparent that there is no appointed contractor to carry out the work as yet. Design documentation has been requested, as has any operating handbook when it becomes available. While it is good that there is a holding area for oily wastes now available on island, there are concerns as to the proposed treatment of these wastes, in particular as the window for bio-remediation on Sakhalin is likely to only be four months of the year when the temperature is sufficiently high for the bacteria to be active. Other treatments ought to be assessed in addition to this facility – thermal desorption, in-vessel bio-remediation, encapsulation etc. – all of which could be installed in Smirnikh.

Another area of potential concern for the site is the current waste operation procedures. It was observed that waste was being disposed of (seemingly without being covered) of in the area of the initial cell constructed at the site (see Picture 20). It is unclear if this initial cell is still intended to be operated or if it is supposed to be closed. We recommend that the status of this cell be clarified by Sakhalin Energy and appropriate acts (e.g. cover or removal of visible wastes) undertaken.

In general the upgraded sites are a big improvement on the previously available landfills on the island and the general running of the sites seems to be reasonably well controlled compared to the fly tipping that has occurred in the past. As detailed above there are still some concerns with regard to the general understanding of the local staff in the running of the sites (for example the practices of increasing bund height and placing material on cover systems) and a detailed audit of the monitoring around the site has not been carried out recently to assess off-site impacts. This will be required in the future in order to demonstrate the improvements or allow for mitigation systems to be put in place as appropriate.

5.2 Non-Upgraded Landfills

5.2.1 Yasnoye Landfill

This is one of the non up-graded landfills that Sakhalin Energy has undertaken to close and reinstate. A total of 35,000m^3 clean spoil material was brought here from Fault 3 to act as cover material. The tipped material present at the site was bulldozed into one area then covered with the clean spoil to a depth of 1m and then seeded. A trench was then dug across the entrance to prevent further unauthorised tipping. However, during the visit it was noted that the trench had been backfilled and fresh tipping of domestic waste had resumed (see Picture 21). There is potential here for the Sakhalin Energy social program to assist the local administration with an education program for the local community in responsible waste disposal.

5.2.2 Old Smirnikh Landfill

This is another non up-graded landfill that Sakhalin Energy have helped close. At this site a total of 200,000m3 of spoil from Fault 8 has been brought into the site to act as final cover material and to seal the site (see Picture 22). Seeding has also been carried out in patches across the site. As at Yasnoye it was noted that some fly tipping at the site had occurred since closure in spite of the fact that the new fully lined site is open 2km away. Some education of the local community is required, and there may be an opportunity for Sakhalin Energy social programs to assist the local authorities in this.

The work carried out by Sakhalin Energy in closing these landfills is a big improvement on the previous conditions on the sites and should have a positive benefit on the environmental and health conditions in the local areas. There has also been a big benefit to Sakhalin Energy in being able to dispose of large amounts of clean construction spoil from the faultline engineering works, so the efforts are to be welcomed. There is a need for the local authorities to continue the good work in ensuring that the local community does not start fly tipping activities again and there may be scope for Sakhalin Energy to assist in this with an education support programme. As the sites are not fully enclosed – there is no bottom lining system in place below the waste – the authorities also need to be aware that there may still be an impact, albeit reduced, on ground and surface waters in the area.

5.2.3 Closure of Other Non-Upgraded Landfills and Waste Dumps

Sakhalin Energy disclosed during the site visit that it intended to assist local authorities to close more of the non-upgraded landfills/dumps (in addition to Yasnoye and Smirnikh as described above) that had previously been used for Sakhalin Energy waste during the early stages of construction. These facilities are in poor condition and inappropriately designed. Therefore, the initiative to close more of these landfills/dumps provides additional environmental benefit. However, care should be taken that where a landfill is to be closed that an alternative waste facility is available within a reasonable distance. We note for example that Sakhalin Energy intends to assist with the closure of a waste dump at Val, but it is unclear whether an alternative facility exists (or is to be developed).

5.3 Waste Disposal End-Points

Discussion held on site at the OPF and in Yuznho with the central HSE staff responsible for waste management indicated that the policy of reduce, recycle and re-use is enforced wherever possible, although a more detailed audit on this will be required in the future. A contract with a local / Canadian owned company, Ecoshelf, has been set up for them to deal with the collection of segregated wastes from the Sakhalin Energy facilities and the disposal of these to appropriate endpoints. This is all controlled by a detailed waste transfer note system that allows the auditing of the waste trail from origin to disposal point with the waste originator receiving the final notice from the endpoint to close the loop. It was noted that there was a gap in the paperwork for the OPF wastes in that the final endpoint notices had not been received back at the facility at the time of the visit. However, this may have been an accident of timing and will be assessed during the audit of the facility later in 2008.

Central HSE also confirmed that they had audited the proposed endpoints put forward by Ecoshelf before sanctioning their use and this is represents good practice. The robustness of the audit can be assessed and the timing of follow-up audits discussed during the planned visit later in 2008, as can the local disposal routes to recycling firms on island.

6 Other Items

6.1 Camp decommissioning and demobilisation

As pipeline construction nears completion, Sakhalin Energy needs to develop plans for the mothballing, abandonment or disposal of the construction camps. At the time of the September 2008 site visit, definitive plans had not been developed for any of the camps, although alternative future usages for most camps are currently being considered. Detailed decommissioning plans are required for each camp once the future disposal/abandonment options are confirmed, including plans for the disposal of assets and materials (e.g. utilities, buildings and fittings etc.) and appropriate site investigation/remediation.

In addition, demobilisation plans are required in order to best manage the termination of local employment. The development of such plans is required under the HSESAP.

6.2 OSR teams at Project maintenance depots (PMD)

PMDs at Sovietskoye and Gastello were visited by AEA and pipeline oil spill response equipment held at the sites were viewed. The available equipment was comprehensive (although wild-life rescue equipment is yet to arrive at the PMDs) and appeared in good order and the storage arrangements were well organised. However, we recommend that consideration be given to providing each PMD with a heavy-duty tracked vehicle (e.g. a bulldozer) to enable all-condition access to the RoW in the event of an oil spill; we understand that such a vehicle is on order at Sovietskoye and suggest that similar arrangements are made at Gastello and all other PMDs.

We understand from discussions with Sakhalin Energy staff in Yuzhno that the oil spill response team at the pipeline PMDs will include two personnel from the CREO company whose responsibilities will include development of oil spill exercise schedules and acting as in-field command during incident response. At the time of the September 2008 site visit CREO staff had only been mobilised at the Soviestoke PMD. Discussions held with these CREO staff revealed that they had no prior in-field oil spill response experience and understood their roles to be primarily for the maintenance of equipment. We recommend that Sakhalin Energy investigates and resolves this apparent mis-match in the experience and responsibilities of the CREO personnel.

6.3 HSESAP Reporting

During the site visit AEA reviewed the HSESAP incident records. As part of this investigation a number of the incidents raised in the June and July lender HSESAP reports were discussed in order to further understand the nature of these incidents and how the Sakhalin Energy significance classification had been derived. In total nine incidents reported in the June/July HSESAP reports were followed-up and AEA found that these incidents were appropriately classified by Sakhalin Energy in line with the assessment methodology outlined in the HSESAP Part 1.

Overall we find the incident reporting system utilised by Sakhalin Energy (which is based on the IMPACT database system) to be good. We note that the functioning of the system as a mechanism for identifying HSESAP breaches relies on individuals at all assets understanding the HSESAP commitments and comprehensively reporting any non-compliances and this will be the subject of ongoing review by the lenders' IEC.

6.4 Health & Safety Aspects

During the course of the site visit a small number of health and safety issues were identified by AEA that we recommend Sakhalin Energy investigates and resolves. These are summarised below:

- A number of manholes at the sewage treatment plant at the Sokol camp were uncovered. These included manhole access to underground tanks without ladder escape that had evidently been left uncovered for some time.
- Fencing around the laydown area at the Sokol camp was seen to be in poor repair, with fencing missing over a significant portion of the laydown perimeter. Given the close proximity of the camp to the village of Sokol and also the intention to use the Sokol laydown camp in the medium term to store various materials from all the pipeline sections as construction comes to an end, we recommend that an appropriate security fence is erected.
- At a small number of sites along the RoW trees were seen overhanging side cuts such that collapse onto the RoW is likely in the near future. This includes areas near the Nizhni Kamyshovka crossing that is located near local houses. We recommend that these are inspected prior to the onset of winter and trees cut down as necessary.

7 Summary and Conclusions

The primary focus of the site visit was on progress made on the reinstatement of the pipeline RoW and against the targets set in the RemAP. Overall, a favourable impression was gained of the reinstatement works being undertaken and, in particular, significant improvements have been identified compared to works witnessed during numerous previous site visits undertaken between September 2003 and June 2008.

High-level reviews were also undertaken to the OPF and LNG, which revealed that these sites appeared to be generally well managed. However, we recommend that more detailed audits of both these facilities be undertaken and these are currently being planned by AEA.

Notwithstanding the generally favourable findings of the site visit, a number of issues have been identified. These are summarised in the table below together with recommended actions for their resolution.

Table 3 Summary of issues and recommendations

Aspect	Issue/recommendation
Progress against RemAP targets	We note that the rate of progress on reinstatement is not expected to meet the RemAP target to complete all reinstatement of the RoW by end of 2008. We recommend that, in the light of the actual progress made, Sakhalin Energy provides an update on the RemAP (for example as part of the monthly RemAP report) including: • The progress made by the end of 2008 (in terms of areas signed off by Sakhalin Energy as RFSU, technically reinstated, and biologically reinstated) • A realistic plan and timetable for completion of technical and biological reinstatement (including success criteria) prior to the spring thaw of 2009.
RoW Winterisation	In relation to winterisation activities, we suggest that geotextile should be used for winterisation in Section 3B. We also note the time pressure under which remaining winterisation works in Section 3 are to be undertaken. This may be complicated by the focus on activities to achieve RFSU by mid-October 2008 and after RFSU (when oil will be in the pipeline) the need for permit to work approvals for winterisation works on the RoW. Progress on winterisation will be re-assessed by AEA during a follow-up site visit planned for November 2008. While we acknowledge the improvements made in temporary erosion controls, we note that on these steep slopes temporary erosion controls cannot guarantee full protection against the spring thaw, especially if there is heavy snow fall in winter 2008/09 (although we note that the additional use of geotextile on these slopes may nonetheless help in reducing erosion).
Riverbank reinstatement	There was a small amount of ponding noted behind the gabion wall at the R. Pobedinka. This will need to be rectified with some minor drainage works prior to the snowmelt in spring in order to ensure that there is no unnecessary pressure build.
RoW Technical reinstatement	We recommend that site-specific assessment be made of all areas showing strong natural re-vegetation and that further levelling activities are only undertaken where technically necessary (e.g. removal of proud crowns over the pipelines or filling in of pits over the pipelines).

Aspect	Issue/recommendation
Future monitoring of RoW reinstatement & geotechnical engineering	Given the nature of the geological hazards posed in some portions of the RoW, ongoing monitoring of the performance and condition of the installed engineering solutions will be required throughout the lifetime of the project. In order to ensure that these issues are successfully managed as the project moves into the operational phase, it is important that existing capability and site-specific knowledge of the RoW is successfully transferred from the construction team to the operational team. This would ideally include retention of key staff for a cross-over period.
	We note that in certain areas, especially where soil fertility is low and original topsoil has been lost, successful biological reinstatement may be a longer term and iterative process. In such cases solutions to aid re-vegetation, such as the use of mulches, different fertiliser mixes and geotextile may need to be experimented with. Given the timeframe over which this is likely to occur, it is important that capability and knowledge of the RoW reinstatement issues is successfully transferred to the operational team from the construction team. We recommend that Sakhalin Energy develop specific plans to ensure that this happens during the 2009 handover period.
Flaring at LNG	Overall, we note that the commissioning process has the potential to reduce overall flaring during commissioning to below previous flaring estimates. We recommend that Sakhalin Energy update their flaring estimate in the light of current experience at the site in order to provide a more realistic assessment.
Construction camp (LNG/OET)	We recommend that a mothballing plan be developed for the LNG construction camp. Decommissioning plans should also be developed for any construction facilities/utilities deemed not to be required. In addition, a demobilisation plan is required in order to best manage the termination of local employment. The development of such a plan is required under the HSESAP and is especially important at the LNG site where approximately 40% of the construction workforce are natives of Sakhalin.
Construction camps (pipelines)	Detailed decommissioning plans are required for construction camps once the future disposal/abandonment options are confirmed, including plans for the disposal of assets and materials and appropriate site investigation/remediation. In addition, demobilisations plans are required in order to best manage the termination of local employment. The development of such plans is required under the HSESAP.
Waste management	We have concerns as to the proposed treatment of oily wastes at Smirnikh and recommend that other treatments should be assessed in addition to this process, such as thermal desorption, in-vessel bio-remediation, encapsulation etc.
	It was observed that waste was being disposed of (seemingly without being covered) in the area of the initial cell constructed at the new Smirnikh landfill site. It is unclear if this initial cell is still intended to be operated or if it is supposed to be closed. We recommend that the status of this cell be clarified by Sakhalin Energy and appropriate acts (e.g. cover or removal of visible wastes) undertaken.
	Care should be taken that where any of the non-upgraded landfills/dumpsites are to be closed that an alternative waste facility is available within a reasonable distance. We note for example that Sakhalin Energy intends to assist with the closure of a waste dump at Val, but it is unclear whether an alternative facility exists (or is to be developed).

Aspect	Issue/recommendation
Oil spill response at PMDs	We recommend that Sakhalin Energy investigates and resolves an apparent mis-match in the expectation of experience and responsibilities of the CREO oil spill response personnel at the PMD.
	We recommend that consideration be given to providing each PMD with a heavy-duty tracked vehicle (e.g. a bulldozer) to enable all-condition access to the RoW in the event of an oil spill; we understand that such a vehicle is on order at Sovietskoye and suggest that similar arrangements are made at Gastello and all other PMDs.
Health and safety issues	During the course of the site visit a small number of health and safety issues were identified by AEA that we recommend Sakhalin Energy investigates and resolves. These are summarised below: • Uncovered manholes at the sewage treatment plant at the Sokol camp. • The need for appropriate security fencing around the Sokol laydown area. • At a small number of sites along the RoW trees were seen overhanging side cuts such that collapse onto the RoW is likely in the near future. This includes areas near the Nizhni Kamyshovka crossing which is located near local houses. We recommend that these are inspected prior to the onset of winter and trees cut down as necessary.

Appendices

Appendix 1: List of Sites Visited

Appendix 2: Photographs

Appendix 1

List of Sites Visited

Location	Date	AEA/Lender Team
Office Discussions		
Yuzhno kick-off meeting	17/9/08	All
Yuzhno office discussions & HSE inductions	18/9/08	All
Yuzhno (office discussions)	25/9/08	All
Yuzhno (close –out meeting)	26/9/08	All
Pipeline RoW and Camp Sites (Section 1A/B)		
Chaivo and pig trap station	19/9/08	2B
KP14 Section 1A	19/9/08	2B
Garomai fault crossings	19/9/08	2B
KP48 BVS NOB 4	19/9/08	2B
KP39 BVS NOB 5	19/9/08	2B
Val construction camp	20/9/08	2B
KP70; Hydro-seeding Operation	19/9/08	2A
KP73.4; Slope repairs	19/9/08	2A
KP77.5 Dagi River and Wetlands	20/9/08	2B
KP78; Hill repairs down to Dagi River	19/9/08	2A
KP92.56 Bauri River and wetlands	20/9/08	2B
KP97 – 98; Block valve 14 temporary access road	19/9/08	2A
KP98.6 Maly Veni River	19/9/08	2A
KP101.5 – 102.0; Access road to block valve 15	19/9/08	2A
KP101.5 NOB 15 and steep slope	20/9/08	2B
KP111 NOB 16 to NOB 17	20/9/08	2B
KP116 Sopochniy Stream	20/9/08	2B
KP124.7 NOB 19	20/9/08	2B
Pipeline RoW and Camp Sites (Section 1C)		
KP 0 Lunskoye Beach Landfall Area	20/9/08	2A
KP7; Vatung River Crossing	20/9/08	2A
KP44.1; Nabil River	20/9/08	2A
KP45 to 47 Hillside restoration	20/9/08	2A
KP64 Pilenga River	21/9/08	2A/B
KP66.7 Vtoraya River	21/9/08	2A/B
KP68 Slavka River	21/9/08	2A/B
KP72 Hill Hydro-seeding	21/9/08	2A/B
KP78.8 Uskovo River	21/9/08	2A/B
KP84.3 Voskrenovka River	21/9/08	2A/B
KP87 Block Valve TGB2/TOB2	21/9/08	2A/B
Pipeline RoW and Camp Sites (Section 2)		
KP95.06 Maly Tym	22/9/08	2A/B
KP118 to 118.6 Fault 3	22/9/08	2A/B
KP127 Sand Slopes	22/9/08	2A/B
KP133.7 Zaprunaya	22/9/08	2A/B
KP145 Block Valve COB1	22/9/08	2A/B
KP175.9 Sedimaya	22/9/08	2A/B
KP178.2 Devyata	22/9/08	2A/B
KP207 to 208; Fault 7	22/9/08	2A/B
KP207.1 Povorotnoye	22/9/08	2A/B
KP212 Northern wetlands	22/9/08	2A/B
KP211.5 Pobedinka	22/9/08	2A/B
KP223 Fault 8	23/9/08	2A/B

Location	Date	AEA/Lender Team
Pipeline RoW, Spoil Tips and Camp Sites (Section 3)		
Leonidovka River and ROW KP276 to 279	21/9/08	1A/B
ROW KP285, 290 and 294	21/9/08	1A/B
Gastelovka River - KP300	21/9/08	1A/B
Kissa River – KP301	21/9/08	1A/B
Fault crossings – KP301	21/9/08	1A/B
Goryanka River – KP313	21/9/08	1A/B
Nitui River – KP324	21/9/08	1A/B
Morskaya River and ROW - KP326 to 330	21/9/08	1A/B
Turkovka River - KP336	21/9/08	1A/B
Tumanovo spoil deposit site – Near Tumanovo Village	20/9/08	1B
Makarov Paper Mill spoil deposit site – Makarov	20/9/08	1B
Gar River – KP345	20/9/08	1A/B
Kormovaya River – KP347	20/9/08	1A/B
Krinka River – KP348	20/9/08	1A/B
Tributary to Krinka River - KP349	20/9/08	1A/B
Pulka River – KP353 to 356	20/9/08	1B
Varvarka River Valley - KP361 to 364	20/9/08	1B
Varvarka Ridge - KP365	20/9/08	1B
Pegas River – KP365	22/9/08	1A/B
Lesnaya 1 River – KP367	22/9/08	1A/B
Madera River – KP369	22/9/08	1A/B
Chinarka River - KP372	22/9/08	1A/B
Lasnaya 3 River - KP376	22/9/08	1A/B
Spoil Tip and Un-named Stream – KP381	22/9/08	1A/B
Sedlets River and spoil tip – KP382	22/9/08	1A/B
ROW and slopes – KP383 to 385	22/9/08	1A/B
Lazovaya 2 River – KP387	22/9/08	1A/B
Approved Spoil Tip Site off the ROW – KP393	19/9/08	1B
Malakhitovka River - KP396	19/9/08	1B
ROW and Slopes KP403 to 397	19/9/08	1B
Vostochney Ridge and spoil deposit site - KP404.5	19/9/08	1B
Vostochnaya River and Slope – KP405	19/9/08	1B
Ssora River - KP 407.4	19/9/08	1B
ROW and Slopes KP409.3	19/9/08	1B
ROW and Slopes KP414	19/9/08	1B
Travyanaya 1 River and slopes – KP418 and 419	22/9/08	1A/B
Pipeline RoW and Camp Sites (Section 4)		
ROW – KP457 to 459	23/9/08	1A/B
Krasnaya River – KP461	23/9/08	1A/B
Nizhni Kamishkova – KP482	23/9/08	1A/B
Kirpichnaya River – KP495	23/9/08	1A/B
Sovietskoye Ridge – KP503	23/9/08	1A/B
ROW - KP533 to 535	23/9/08	1A/B
Fault 21 Crossing	24/9/08	1A/B
ROW – KP600	24/9/08	1A/B
ROW – KP607	24/9/08	1A/B
Korsakov River – KP608	24/9/08	1A/B
Maraya River - KP614	24/9/08	1A/B
Waste facilities		
Nogliki Landfill	19/9/08	2A
Yasnoye Landfill	22/9/08	2A/B
Old Smirnikh Landfill	23/9/08	2A/B
New Smirnikh Landfill	23/9/08	2A/B
Korsakov landfill	19/9/08	1A
Other		
OPF	20/9/08	2A
LNG	19/9/08	1A

Appendix 2

Photographs

Picture 1 **Well-spaced slope breakers (protected with geotextile) in the Varvarka Valley**

Picture 2 **Slopes around KP458 requiring additional slope breakers**

Picture 3 **French drain and gabion wall constructed in the Varvarka Valley**

Picture 4 **Slope adjacent to a tributary to R. Sedlets where slopes breakers are too steep and need to be extended across the running track**

Picture 5 **Erosion forming at the end of a drainage channel near R. Pegus**

Picture 6 **Natural re-vegetation of the RoW around KP 372**

Picture 7 Successful hydroseeding at Fault Crossing near KP302

Picture 8 R. Leonidovka (south channel) awaiting installation of permanent bank protection

Picture 9 **Comparison of RoW at KP 101.5 (Section 1B) between November 2007 (left) and September 2008 (right)**

Picture 10 **Comparison of RoW at KP 127 (Section 2) between May 2007 (left) and September 2008 (right)**

Picture 11 **Comparison of Riverbank reinstatement at R. Pobedinka between May 2006 (left) and September 2008 (right)**

Picture 12 Ponding behind the gabion wall at the R. Pobedinka

Picture 13 Comparison of the RoW in the Varvarka valley between May 2006 (left) and September 2008 (right)

Picture 14 Comparison of the wetland around KP212 between May 2006 (left) and September 2008 (right)

Picture 15 Riverbank erosion outside of the RoW at the R. Pobedinka

Picture 16 Riverbank erosion outside of the RoW at the R. Kirpichnaya

Picture 17 Slope adjacent to the R. Gar showing steep side cuts

Picture 18 Nogliki landfill entrance (left) and active cell (right)

Picture 19 Smirnikh bioremediation cell (left) and oily waste holding area (right)

Picture 20 On-going landfill operations on the inital cell at Smirnikh

Picture 21 **Views of the Yasnore waste tip showing new covered tip area (left) and recently tipped waste (right)**

Picture 22 **Views of cover material over the former Smirnikh landfill**

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