SAKHALIN, FAR EAST
Landslides and construction of oil and gas pipeline

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**Name of the project:** Sakhalin II – Onshore pipelines

**Goal of the project:** construction of gas and oil pipeline from North of Sakhalin to the south

**Client:** Sakhalin Energy Investment Company Ltd (SEIC)
(Shell, Mitsubishi a Mitsui)

**Geological service of the client:** Scott Wilson Kirkpatrick & Co Ltd.

**Geological investigation:** Inzashita

**Contractor:** Starstroj

**Geological service of the contractor:** ARCADIS
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**Engineering geological problems to be solved:**

- Liquefaction of sandy sediment due to earthquake
- Low bearing capacity of subsoil
- Active tectonics
- **Slope stability**
- Landslides and erosion
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Hilly area around the city of Makarov
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EROSION
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LANDSLIDES
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Morphology interpretation
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Morphology interpretation

Landslides
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Morphology interpretation

Landslides

River terraces
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Morphology interpretation

Landslides

River terraces

Rock structure

Rock structure
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Morphology interpretation

Landslides

River terraces

Rock structure

Faults
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Principles of landslide hazard mitigation – to avoid landslide areas, to route pipelines on ridges not affected by landslides, to avoid routing on steeper side slopes.
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Across unstable areas in shallow landslides – to remove unstable ground or to deepen the route of the pipelines until reaching stable rock

Trial pit at shallow landslide - slip surface up to 3.5 m under ground
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OKHOTSK SEA
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Times
www.sakhalintimes.ru

Weather forecast for YS
22/7/12 Mon Aug 30 Scattered Showers 24°/14°
21°/12 Tue Aug 31 Rain 23°/14°
22°/12 Wed Sep 01 Rain 23°/15°
22°/12 Thu Sep 02 Partly Cloudy 22°/13°

Sakhalinsk

Investment climate. The development of the Sakhalin industry, fuel and gas is one of the key components of the regional economy. The development of production activities has become a priority for the region.

Sakhalin

Bear Hunting season begins in Sakhalin
On August 14, the brown bear hunting season officially commenced in the Sakhalin Region. Licensed hunting of brown bears is now permitted in all areas of the Sakhalin Region except the guarded territories which include reserves, nature memorials and barred zones. The hunting season will last till December 31, 2004. The license fee is 3300 roubles including tax. Nearly 4000 brown bears live in the Sakhalin and the Kurils.
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UNEXPLODED ORDNANCE
Sakhalin, Far East,
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LEATHER PRODUCTION, WOOD PRODUCTION, COAL MINING, FISHING
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CRAB FISHING NET
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Conclusion

• To diminish impact of geological hazards on the construction and operation of roads and pipelines – anticipation of potential geological problems at an early stage of project

• During construction, mistakes from early routing decision is possible to mitigate only in limited extent by rerouting of smaller sections and thus to avoid problems areas

• If it is not possible avoid problems areas - engineering geologist works in cooperation with engineer in order to pass successfully troubleshoot areas or to solve problems that have already occurred.