Sakhalin II
Oil Spill Response Preparedness for Expansion to Phase 2 Operations

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Introduction

Sakhalin Energy Investment Company, Ltd. (Sakhalin Energy), the operator of the Sakhalin II project, began production at its Phase 1 asset known as the Molikpaq platform in 1999. Since that time, the company has actively been developing its Sakhalin Island oil and gas project for expansion to Phase 2 operations. The Phase 2 project includes the addition of two new offshore platforms, two onshore pipelines, an onshore processing facility, plus an LNG plant and Oil Export Terminal.

An extensive work programme was initiated to support planning for oil spill response preparedness. This presentation outlines that programme and also discusses some of the challenges that have been encountered in developing the contingency plans and the additional measures that are being taken to meet the ongoing challenges.

Sakhalin Energy Oil Spill Response Work Programme

The objectives of the Sakhalin Energy OSR Work Programme are:

- To establish a world class OSR system that will provide the best possible protection to the environment in the event of a spill.
- To establish a scientifically based and practically focused work programme that will sustain longer term development of OSR within Sakhalin Energy, on Sakhalin and within the region.
- To cooperate with municipal, Sakhalin Oblast and Russian Federal authorities in developing wider OSR capabilities.

The initial OSR work programme addressed a number of identified issues including:

- Cultural considerations such as language barriers and differences between RF and western regulatory requirements.
- Environmental sensitivities and social issues.
- Oil character and behaviour and the effects of climate on oil behaviour.
- Oil spill response in ice conditions
- Response logistics; i.e remoteness and available infrastructure.
- Suitable equipment.
- Trans-border response issues.

Sakhalin Energy Response Preparedness

Sakhalin Energy has committed to developing OSR preparedness and response capability in full compliance with Russian national and local regulations, shareholder and industry standards and best international practice.

Emergency Response Organisation

The Emergency Response organisation within Sakhalin Energy consists of the

- Crisis Management Team which handles high level crisis management and interaction with the government and external agencies;
- Emergency Coordination Team which deals with central coordination and management of incidents; and
- Site Control Teams which manage the on-site response activities.

In large scale or complex responses, a Unified Command may be established under the Unified State System for Prevention of and Response to Emergencies. The Russian Federation Unified Command (RSChS) concept reflects internationally recognised best practice. It provides for the reciprocal integration of Sakhalin Energy and governmental and independent ER/OSR personnel into teams and it is anticipated that Sakhalin Energy will fully participate in any Unified Command formed in response to a Sakhalin Energy Tier 2 or 3 spill incident.

Oil Spill Response Documentation

The Sakhalin Energy Oil Spill Response Plans are part of an OSR Management System comprised of the following documents (Fig. 1):

- OSR Policies,
- OSR Procedures,
- Background Papers,
- Corporate Oil Spill Response Plan (COSRP),
- Facility Oil Spill Response Plans (OSRPs),
- OSR Handbooks,
- OSR GIS Database and Environmental Resource Maps, and
- Tier 1 OSR Contracts
- Higher tier contracts (OSRL, EARL,), and
- Industry MOUs.

The Corporate Oil Spill Response Plan (COSRP) sets out the Sakhalin Energy arrangements for OSR. It provides guidance on the location and function of all OSR and ER related documents and stipulates responsibilities for their maintenance and implementation. The COSRP does not require Russian Federation government approval.

Facility OSRPs set out the OSR arrangements at each Sakhalin Energy facility. They contain not only OSR operational information but risk assessments, plan maintenance, and general OSR system maintenance information. The structure and contents of these Facility OSRPs are stipulated by Russian Federation (RF) decrees and regulations, primarily RF Government Decrees 613 and 240 and Ministry of Civil Defence, Emergencies and the Elimination of the Consequences of Natural Disasters (MChS) Order 621.

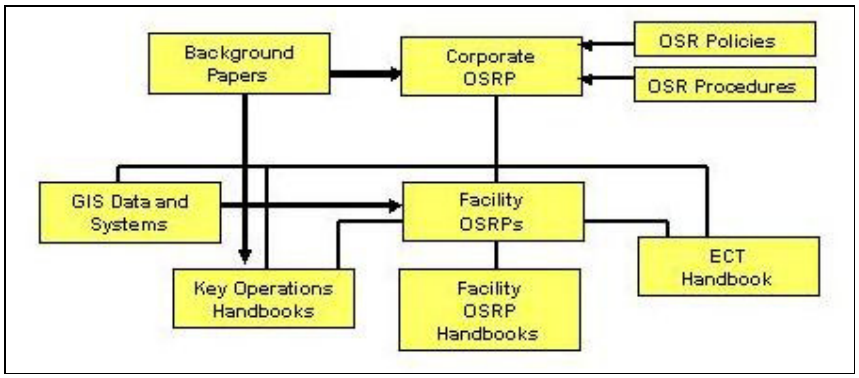

Figure 1. Sakhalin Energy OSR Documentation

Facility OSRPs must be approved by government agencies and as part of the approvals process, each plan is submitted to a State Expertise organisation for a review of the plan for technical adequacy and for compliance with the Russian Federation regulations. A positive Expertise conclusion must be in place to obtain government agencies approvals.

In addition to the rigorous Russian Federation regulatory approvals process, the OSRPs are also reviewed by independent experts contracted by a third party contractor of the potential Phase 2 Lenders.

Implementation of the OSR Work Programme

The content of the OSR documentation stems from the results of several years of research and planning. In order that the best information and technologies were available for planners, a comprehensive work programme was put in place (Fig. 2). This programme is outlined in three phases.

Phase 1: Review of OSR Status in Sakhalin Energy.

This phase involved a thorough review of all available oil spill-related information held by Sakhalin Energy. This included the Emergency Response Plans, Oil Spill Response Plans, environmental survey data and resource maps, risk assessments, OSR equipment and response Contractors, RF regulations and international best practice.

Phase 2: Development of the Sakhalin Energy OSR System.

Based on the findings of the Phase 1 reviews, a number of Projects were initiated. These were primarily focussed at providing information needed to develop the Facility Oil Spill Response Plans, but were also intended to ensure the adoption of best practice and best available technology.

A number or projects were also focussed on improving cooperation with Government agencies and other companies in the development of OSR resources for Sakhalin.

Phase 3 Ongoing Studies.

These longer-term projects are designed to ensure that new technology is identified and, where appropriate, adopted by Sakhalin Energy. They will ensure that Sakhalin Energy OSR capabilities are steadily maintained and improved over time. The Phase 3 Study programme is outlined in both Corporate OSRP and Facility OSRPs.

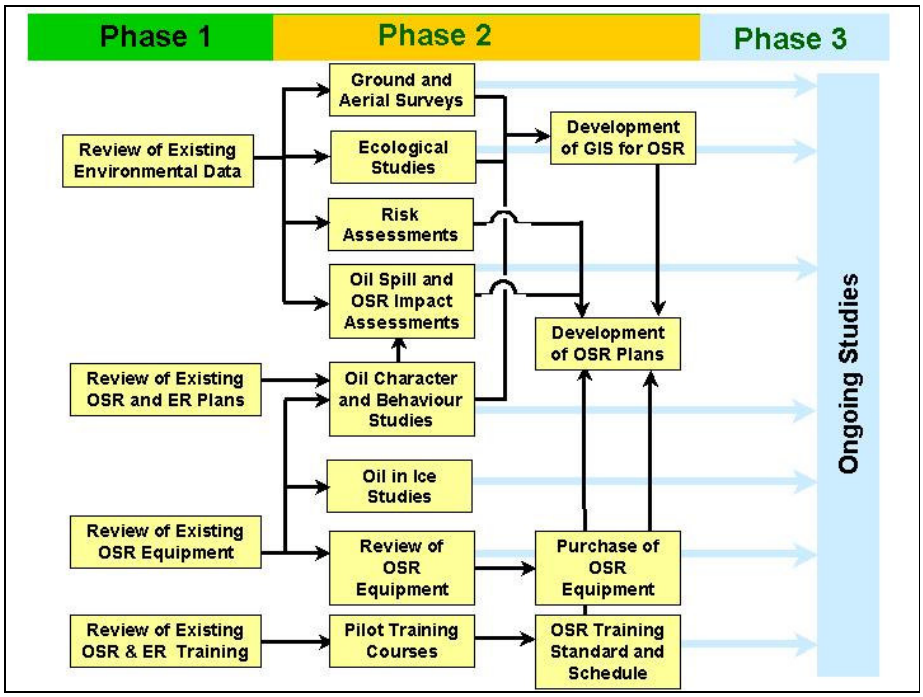

Figure 2. Sakhalin Energy OSR Work Programme

Current Status

Sakhalin Energy is now entering the third phase of the programme. The Facility OSR plans are in the final stages of approval and implementation, OSR equipment has been purchased and is in most cases already on site at its respective Emergency Response Depot. Personnel are either trained or are being trained.

The remaining text will outline how various aspects of the work programme have assisted in overcoming planning challenges.

Outline of the OSR Work Programme

Oil Character and Behaviour

The behaviour of oil at sea, in rivers and streams and in ice conditions is an important consideration in designing oil spill response methods. A comprehensive programme of studies designed to build understanding of the crude oil character and behaviour under a variety of conditions has been undertaken to build on previous work.

A number of physical and chemical characteristics of fresh Vityaz crude have been determined to establish the character of the fresh oil and its weathering behaviour. The parameters include:

- Specific gravity.
- Viscosity (at various temperatures).
- Pour point.
- Wax content.
- Asphaltene content.
- Emulsification potential and water miscibility (at various mixing energies and temperatures).
- Evaporation rates under various conditions.

These characteristics are also being determined for oil weathered for various times.

In situ burning is a valuable response option in ice conditions but must be considered carefully from an environmental point of view. Sakhalin Energy crudes and condensates will burn, even after weathering at sea, but laboratory studies have been undertaken to better determine the efficiency of burning, ignition temperatures and characteristics of any residues that may be left after combustion is complete.

The efficiency of dispersants has also been assessed, on both fresh and weathered crudes at a range of temperatures and mixing energies.

The potential for oil biodegradation has also been assessed.

Oil Behaviour and Oil Spill Response in Ice

The presence of ice does present challenges for OSR. High ice cover inhibits access by response vessels and also limits the range of recovery devices that can be deployed. However, high ice cover also inhibits the spread of oil and slows trajectory.

Sakhalin Energy has reviewed, and is continuing to review the available equipment for oil recovery in ice conditions. These are being assessed against the conditions that exist offshore and onshore Sakhalin Island.

Ongoing development is carried out through continuing Oil in Ice studies and participation in industry R & D programmes.

Environmental and Social Sensitivities

Sakhalin Island is an area rich in biological resources. It is an important stopover point for migratory birds and an equally important habitat for resident species. There are numerous rare and endangered species that can be found in the Sakhalin area.

Industries based on natural resources are of primary commercial importance to Sakhalin residents and the livelihood of many locals depends on these. In addition, there are indigenous and local communities located near project areas, which need to be considered.

During the planning phase of the Sakhalin project, a tremendous amount of data was collected with respect to environmental and social information. A considerable portion of this data was linked to the immediate project footprint or in near proximity to it. In planning oil spill response within the potential zones of impact, it was found that the project archives did not always contain sufficient information or cover the entire potential response area. Even where the information did exist, it was not always in a format readily available to oil spill responders.

To overcome this, several studies were initiated with local contractors to do archive research of existing material for the areas in question and to conduct field surveys to fill data gaps.

All of the data was compiled in the Sakhalin Energy GIS and contributed to the compilation of two OSR Resource Map Atlases: one for the shoreline and one for areas relating to the onshore pipeline facilities.

Aerial and Ground Surveys: Logistics and Infrastructure

Sakhalin Island is a frontier land with many untouched areas. The remoteness and lack of infrastructure can be a challenge for oil spill response and detailed maps were not always available to properly assess the existing situation.

To have a clear indication of available access routes and their conditions, Sakhalin Energy initiated extensive field investigations throughout the island. The field team spent two years investigating roads and tracks to the shoreline and areas downstream of the pipeline. They logged information on road condition and bridge infrastructure, taking note of what types of vehicles would be capable of passing the encountered terrain. All of this information was geo-referenced and is included in the OSR resource map database.

The field team also escorted hydrology and geomorphology specialists, who conducted investigations of the river and shoreline access points. These specialists recorded physical characteristics and biological descriptions of the sites. The resulting data in the form of written data forms, site sketches, ground-truth pictures, and aerial video were compiled in a geo-referenced database for the Sakhalin Energy GIS system.

OSR GIS System

As a result of combining this work with the historical data, the OSR database for GIS contains extensive information for responders to utilise in the event of a spill. Not only is the information available for immediate use during incidents, but it was also a valuable tool for planners who were able to produce site-specific response strategies for key sites and to evaluate the best equipment for the given conditions.

The challenges of access, seasonality and extreme weather conditions were taken into account when the equipment stock and its method of deployment were chosen. Not only did the response kit itself need to be suited to the Sakhalin environment, but the mode of transport to get it to site also required some thought.

Russians have a great deal of experience in winter climates and situations where difficult access is at task. As a result, a range of suitable vehicles are available in the country for handling such terrain.

Establishment of Emergency Response Depots

To be capable to respond within the response time schedule stipulated by Russian Federation regulations, OSR equipment is to be staged at locations throughout the project area.

Onshore equipment is held at the emergency response depots located at the LNG Plant/Oil Export Terminal at Prigorodnoye and the Pipeline Maintenance Depots located at Nogliki in the far north of the island, the OPF site, the village of Yasnoye, the Booster Station site at Gastello, and the village of Sovetskoye.

Offshore equipment consists of stock held at the LNG Plant/Oil Export Terminal at Prigorodnoye, Kholmsk shorebase, and Nogliki as well as on the offshore facility standby vessels. The vessels on standby during winter will be ice-breakers fully equipped with OSR equipment and trained crews.

Training and Exercises

Exercises are already conducted regularly to test the efficacy of response methods and to ensure responders are drilled. In 2007, training exercises were held during different seasons at various locations including the OPF site, Prigorodnoye (both onshore and offshore), and in the northeast (onshore and offshore).

Trans-Boundary Response

During the early stages of the OSR work programme, spill modelling was done for Aniva Bay, La Perouse (Soya) Strait as well as northeast Sakhalin.

Spills from Prigorodnoye offshore facilities and associated shipping may, in some circumstances, enter Japanese territorial seas and even impact the shorelines of Japan (Hokkaido).

In order to respond to these scenarios, Sakhalin Energy has entered into a Memorandum of Understanding with the Japanese Marine Disaster Prevention Centre (MDPC) to ensure that Japanese authorities are informed and that a response is mounted within Japan. The objectives of the MoU are to:

- Facilitate cooperation between MDPC and Sakhalin Energy in the event of an oil spill.
- Promote regional cooperation in OSR preparedness: planning, training and exercises.
- Encourage the flow of information between Sakhalin Energy and the Japanese oil spill response agencies.

One of the recent achievements of this relationship is the completion of the Hokkaido Regional Oil Spill Response Plan. Several OSR experts from Japan contributed to the compilation of this Sakhalin Energy-funded project. The document provides detailed contingency planning for the northern Hokkaido coastal areas.

In addition to the reporting arrangements provided under the MDPC MoU, Sakhalin Energy will also report spills with potential to enter Japanese waters to the Japanese Consulate in Yuzhno-Sakhalinsk. Under the possible Phase 2 loan agreement, Senior Lenders would also be included in the reporting procedure.

Conclusion

The Sakhalin onshore and offshore environment presents a number of challenges for oil spill response. To address these challenges, Sakhalin Energy has developed a robust OSR capability with contingency planning and resources that are suited for the specific conditions encountered in the Sakhalin region. Strategies and methods are based on existing and proven techniques and represent world's best practice and best available technology. Sakhalin Energy OSR continues to assess new technology with a view to acquiring this and incorporating it into OSRPs. This is an ongoing process and an ongoing commitment.