Greenpeace Russia Analysis

Gaps in the oil spill prevention and response plan for the operational area of the Prirazlomnaya offshore ice-resistant stationary platform of Gazprom Neft Shelf

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Greenpeace Russia has analyzed a Summary of the oil spill response plan (OSRP) published on the company’s official website and found numerous gaps that challenge its effectiveness and reliability.

Gazprom Neft Shelf refuses to report publicly the full text of the Plan, ignoring the recommendations of the Arctic Council. That means substantial parts of the information is unavailable, including the amount of financial security a company is obligated to prepare for dealing with oil spills and how it will be provided. It means that number of gaps and failures could be bigger.

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1. Regulatory framework for plans for oil spill prevention and mitigation at sea.

1.1. Obligation to have plans for prevention and combating oil spills at sea and other requirements related to oil spill response and prevention.

According to the Federal Law № 116-FZ On industrial safety, in order to ensure preparedness for accident localization and mitigation, an organization operating hazardous production facilities is required to plan and implement measures to localize and mitigate the consequences of accidents at hazardous production facilities.
To meet this requirement of the Russian Law, it is essential for projects connected with oil production and transport to have a plan of activities for localization and mitigation accidents related to oil spills.

In accordance with the *rules of organization of measures for oil spill prevention and response in the Russian Federation* (approved by the Government Decree of April 15, 2002 No 240), it is mandatory for organizations with hazardous production facilities to have a plan for oil spills' prevention and mitigation.

Apart from having an oil spill prevention and response plan, organizations are required by these rules to do the following:

- to allocate funds, material and technical resources for the implementation of these plans;
- to conduct engineering and technical activities well in advance to prevent possible oil spills and (or) reduce the scale of their consequences;
- to adjust plans to changing source data.

### 1.2. Basic requirements for the content of oil spill prevention and response plans and their development.

Basic requirements for an oil spill prevention and response plan development (hereinafter the Plan) are outlined in the Government Decree of August 21, 2000 No 613.

According to the Decree, *Plans* should be tailored for the maximum possible amount of spilled oil and oil products, that is calculated for sea conditions on the basis of the following volumes:

- the volume of 2 tanks of an oil tanker;
- the volume of an oil barge - 50 percent of its total carrying capacity;
- stationary and floating oil drilling rigs and oil terminals — 1,500 tonnes.

Accordingly, when calculating the required amount of resources, the following data should be considered:

- the maximum possible amount of spilled oil and oil products;
- the area of a spill;
- time of an oil spill localization, which should not exceed 4 hours for water areas.

The following types of emergency situations at sea are outlined, depending on the volume of an oil spill:

- Local-scale - spills from a minimum level (defined by the specially empowered federal executive body for environmental protection) up to **500 tonnes** of oil and oil products;
- Regional-scale - spills from **500 to 5,000 tonnes** of oil and oil products;
- Federal-scale - spills **above 5,000 tonnes** of oil and oil products.

Depending on the spill location and meteorological conditions, a higher level of emergency can be declared.

Depending on the size of the spill, *Plans* are tailored for federal, regional or local (object) levels.

Comprehensive exercises or command and staff trainings are organized at least once every 2 years in order to practice federal-scale and regional-scale oil spill response plans.

As specified in the Order of the Russia's Ministry for Civil Defense, Emergencies and Elimination of
Consequences of Natural Disasters of December 28, 2004 No 621, *The Plan* for a local-scale spill is valid for 3 years, while *Plans* for the regional and federal levels are valid for 5 years.

Besides, the *Plans* are subject to correction if the source data affecting determination of an oil spill level has been changed, and the approving executive bodies should be notified about the amendments.

### 1.3. Oil Spill Prevention and Response Plans examination and approval.

According to *Requirements for Oil Spill Prevention and Response Plans Development* (approved by the Government Decree of 21 August 2000, No 613), oil spill prevention and response plans at federal level are to be developed by the State Marine Emergency and Rescue Coordination Service of the Russian Federation and approved by the Ministry of Transport of the Russian Federation, the Ministry of the Russian Federation for Civil Defense, Emergencies and Elimination of Consequences of Natural Disasters and the Ministry of Natural Resources and Environment of the Russian Federation.

At the regional level oil spill prevention and response plans are developed by companies which carry out oil exploration and extraction as well as refining, transportation and storage of oil products and approved by the Ministry of Energy of the Russian Federation and the Ministry for Civil Defense, Emergencies and Elimination of Consequences of Natural Disasters and the Ministry of Natural Resources and Environment of the Russian Federation.

According to the *Rules for Development and Approval of Oil Spill Prevention and Response Plans on the territory of the Russian Federation* (approved by the Order of the Ministry for Civil Defense, Emergencies and Elimination of Consequences of Natural Disasters of the Russian Federation of December 28, 2004 No 621), *Plans* are subject to examination for compliance with the requirements of regulatory documents used in *Plans' development, as well as with the special-purpose requirements and restrictions outlined in the relevant regulations and specifications. Approving executive authorities organize the examination in accordance with the requirements of the norms regulating these activities."

In accordance with the recently adopted Federal Law of December 30, 2012 No287 *On Amendments to the Federal Law "On the continental shelf of the Russian Federation" and the Federal Law "On the internal waters, territorial sea and contiguous zone of the Russian Federation"*, the special procedure for the approval and examination of the Plans for Prevention and Mitigation of Oil Spills *at sea* changes was adopted.

As per new procedure, *the Plan* is approved by the operator, following a positive conclusion of the State Environmental Expertise and with subsequent notification (according to procedures established by the Government of the Russian Federation) of federal executive bodies defined by the President of the Russian Federation and the Government of the Russian Federation accordingly. If *the Plan* is an integral part of project documentation, which is provided by the Russian Law *On subsoil*, a separate positive conclusion of the State Environmental Expertise of *the Plan* is not required.

The new law came into force on July 1, 2013. Thus, in theory, the regional-scale oil spill prevention and response plan for the *Prirazlommaya* platform previously developed by *Gazprom Neft Shelf* and approved by the government is not subject to this law.
2. A problem associated with the division of responsibility depending on the scope of oil spills in the area of the "Prirazlomnaya" platform as well as legal requirements for regional-level response plans to be developed by the operating organization.

According to Requirements for Oil Spill Prevention and Response Plans Development (approved by the Government Decree of 21 August 2000, No 613), oil spill prevention and response plans at federal level are to be developed by the State Marine Emergency and Rescue Coordination Service of the Russian Federation and approved by the Ministry of Transport of the Russian Federation, the Ministry of the Russian Federation for Civil Defense, Emergencies and Elimination of Consequences of Natural Disasters and the Ministry of Natural Resources and Environment of the Russian Federation.

At the regional level oil spill prevention and response plans are developed by companies which carry out oil exploration and extraction as well as refining, transportation and storage of oil products and approved by the Ministry of Energy of the Russian Federation and the Ministry for Civil Defense, Emergencies and Elimination of Consequences of Natural Disasters and the Ministry of Natural Resources and Environment of the Russian Federation.

The maximum possible oil spill in the area of platform "Prirazlomnaya" is 10 000 tonnes (in case of a tanker accident, an oil spill of maximum 10 000 tonnes is possible – this is a size of two adjacent tanks of a tanker of 70 000 deadweight tonnes). According to the Summary of the Oil Spill Response Plan for the operational area of the platform “Prirazlomnaya”of “Gazprom Neft Shelf” (hereinafter, the OSRP), «an oil spill of 10 000 tonnes is defined as a federal-scale spill. The Company and Professional Rescue Units have enough resources to mitigate the spill at the first stage until the government forces arrive, including those of the Ministry for Civil Defense, Emergencies and Elimination of Consequences of Natural Disasters, the Russian Navy, Russia's State Maritime Rescue Coordination Centre as well as Coast Guards of neighboring states.”

If incapable of mitigating the spill with its own capacities,"Gazprom Neft Shelf" requests assistance from the Federal Agency for Maritime and River Transport of the Russian Federation (“Rosmorrechflot”). “Rosmorrechflot” decides on the enactment of the Federal Oil Spill Contingency Plan at Sea.

In the OSRP, a regional-scale spill of 1,500 tonnes (loss of oil well control) is considered as the main and most likely scenario. To mitigate a regional-scale spill, the forces and means at the disposal of "Gazprom Neft Shelf" are to be used, as "the forces and means of the Company and Professional Rescue Units are enough to mitigate a spill of 1,500 tonnes.” Thus, in this part the OSRP meets the response plan for a regional-scale spill (above 500 tonnes, but less than 5,000 tonnes). The OSRP is approved by the Ministry for Civil Defense, Emergencies and Elimination of Consequences of Natural Disasters and the Ministry of Energy, as required for the approval of regional-scale response plans, according to the Government Decree of August 21, 2000 № 613.

However, the regional-level OSRP developed by Gazprom Neft Shelf for the Prirazlomnaya oil field does not cover the scenario of an oil spill of above 1,500 tonnes (for example, in case of a tanker accident with a compartment depressurization — 5,000 tonnes). In this case, as indicated in the OSRP, Gazprom Neft Shelf will, if necessary, request assistance from Emergency Situations Commission of the Federal Agency for Maritime and River Transport of the Russian Federation (“Rosmorrechflot”). “Rosmorrechflot”decides on the enactment of the so-called Regional Oil Spill Contingency Plan in the Western Arctic.

According to Gazprom Neft Shelf's Oil Spill Prevention and Response Plan, there is a sequence of actions for any oil spills, including those of superior level, when "Gazprom Neft Shelf" receives additional resources of a
regional-level oil spill contingency plan, and under certain conditions, the mitigation of a regional-scale oil spill (up to 5,000 tonnes) is carried out in accordance with another regional plan - the so-called Regional Oil Spill Contingency Plan in the Western Arctic.

According to information available to Greenpeace Russia, the Regional Oil Spill Contingency Plan in the Western Arctic (at least its 2003 Edition) was not developed by Gazprom Neft Shelf and was approved by Gosmorspassluzhba of the Ministry of Transport of the Russian Federation (Russian Marine Emergency Rescue Service).

The OSRP of Gazprom Neft Shelf for an oil spill from 1,500 tonnes to 5,000 tonnes lacks confirmation of the availability of means and resources to implement the regional-level oil spill response plan, which violates the Government Decree of August 21, 2000 № 613, that requires the organizations conducting oil exploration, production, refining, transportation and storage to develop regional-level oil spill response plans (up to 5,000 tonnes).

Accordingly, Gazprom Neft Shelf in its OSRP confirms that the company has no sufficient means and resources to effectively mitigate regional-scale oil spills that range from 1,500 tonnes to 5,000 tonnes in volume.

3. Availability of information about the oil spill prevention and response plan for the operational area of the Prirazlomnaya offshore ice-resistant stationary platform, including the financial security for the OSRP.

According to the Arctic Council recommendations for regulating economic development of the shelf zone, including hydrocarbons extraction, approved by Russia, oil spill contingency plans should be public.¹

In violation of the Arctic Council recommendations, Gazprom Neft Shelf refuses to report publicly the full text of the Oil Spill Prevention and Response Plan for the operational area of the Prirazlomnaya offshore ice-resistant stationary platform.

The company's official website contains only a Summary of the Plan, concealing the substantial part of information, including the amount of financial security for both the regional-scale and the federal-scale (up to 10,000 tonnes) oil spills. From the Summary, it is not clear how big is the amount of financial security and how it will be provided (banking guarantee, fund, etc.).

Absence of this data makes it impossible to give an independent assessment of the OSRP effectiveness for Prirazlomnaya oil field.

4. Accuracy of calculations and definitions, sufficiency of equipment and information, outlined in the oil spill prevention and response plan.

Below is an analysis of some calculations and evaluations of the effectiveness of technologies used in the oil spill prevention and response plan for the Prirazlomnaya ice-resistant stationary platform of Gazprom Neft Shelf.

¹ Final draft Arctic Offshore Oil and Gas Guidelines (2009) Protection of the Arctic Marine Environment (PAME) working group of the Arctic Council—Mark-Up Copy of the Arctic Offshore Oil and Gas Guidelines (2009)
The list of deficiencies and possible gaps is clearly incomplete, partly due to the fact that Gazprom Neft Shelf refused to make the full text of the OSRP available to public (see also section 3).

4.1. Accuracy of calculations and definitions, sufficiency of information, provided in the oil spill prevention and response plan.

**Mistakes in timing additional resources delivery to mitigate a major oil spill in bad weather conditions.**

It is assumed that the company will meet the time requirements of 4 hours for deployment of oil spill localization equipment. In case of large spills, additional resources are to be delivered by helicopter from the village Varandej as well as by planes from other cities in the region. Delivery time from Varandej to the spill site is 1 hour (p. 19, OSRP Summary).

However, the scenario of bad weather for helicopters flights (storm, darkness, etc.) as well as timing for additional equipment (eg: missing booms of 2000 mm height) delivery by alternative route, such as by sea (about 60 km), are not provided in the Summary of the OSRP. Though equipment shipping from Varandej may take up to 4 hours.

**Insufficient quantity of multipurpose icebreakers for permanent standby duty.**

Two multifunctional icebreaking supply vessels (MISV) Yuri Topchev and Vladislav Strizhev are carrying the main equipment of Gazprom Neft Shelf for oil spill mitigation activities.

As it follows from the OSRP Summary, the MISV are to be on a constant standby duty next to the Prirazlomnaya platform. Though it is not clear if the vigil should be carried out by at least one vessel or by both of them.

Thus, according to the OSRP Summary. "Oil skimming in the broken ice is to be carried out by «Arctic Skimmer», while in iceleads the oil should be collected by the skimmer «Minimax-60». Both of these skimmers are located on board the MISV that is carrying out its standby duty next to the platform."

As it follows from this and other parts of the OSRP Summary, the standby duty may be undertaken by only one vessel. If so, some of oil spill response scenarios outlined in the OSRP Summary are not well-developed.

For example, the planned deployment of 800 meters of high booms (2,000 mm) to localize thick oil during a 10,000 tonnes spill (p. 14 of the OSRP Summary) is possible only with support of two MISV, each carrying 400 meters of high booms on board (p. 21 of the OSRP Summary).

**The «thicker part» of an oil spill is not defined.**

The thick oil should be encircled by 2,000 mm booms in the first place in case of a 10,000 tonnes spill (p. 13 of the OSRP Summary), though the definition of the thick oil is not provided in the document.

**Seaworthiness of speed boom-laying boats and landing crafts LC9000 is not defined.**

Speed boom-laying boats (2 boats located aboard two MISV: one boat on each MISV) and a landing craft LC9000 (to work in shallow waters and deliver personnel and equipment to hardly accessible parts of the
shore) are essential elements for the OSRP. The seaworthiness of the boats, and, in particular, conditions they can operate in (first of all, the height of the wave) are not defined in the OSRP.

For boom-laying boats (draft 1 m, length 10 m), whose displacement can be estimated at around 30 tonnes, the seagoing capacity can be estimated as storm category 4-5 points maximum.

In this regard, storms of Category 5 and above, which do not allow using these boats to deploy equipment for oil spill containment, are not considered in oil spill scenarios.

Without the data about the boats' limitations, the conclusion that Professional Rescue Units and the Company have enough resources to mitigate a spill of 1.5 thousand tonnes, given that it takes 2 hours to deploy 1.2 thousand meters of booms using those boats (p. 13 of the OSRP Summary), requires refinement.

**Limited description of weather conditions, particularly storm conditions for the region.**

The OSRP Summary lacks description of worst storm conditions as well as information about the number of unfavorable days a year in terms of storm conditions, making it impossible to assess the possibilities and limits of using supply vessels (eg: boom-laying boats), helicopters, estimate boom efficiency and so on.

Without these limits assessment, the conclusion that *Gazprom Neft Shelf* has enough resources to mitigate an oil spill of 1.5 tonnes at a time given for deployment of 1.2 thousand meters of booms of two hours, requires a refinement.

**Lack of evaluation of marine booms effectiveness.**

According to the OSRP, to mitigate a spill of 1.5 thousand tonnes of oil, 1.2 thousand meters of inflatable booms should be deployed by boom-laying boats. Collecting 1.5 thousand tonnes of oil takes 16.6 hours. Situation modeling during command and staff trainings as well as expert assessment by the *Central Research Institute of the Navy* confirmed that the Company and Professional Rescue Units have enough resources to mitigate a 1.5 thousand tonnes spill.

However, the assessment does not consider the existing experience of mitigating oil spills at sea. An analysis of 25 cases of oil spills affecting marine, coastal and seaside protected areas in 1997-2011, conducted within the framework of UNDP-GEF in November 2011, showed that in 15 cases oil containment booms were not used (rough sea, strong currents, lack of booms and resources to install them, etc.), and in 9 cases the booms were ineffective (swept away by waves or tidal currents, insufficient number of booms, etc.)

**Incorrect effectiveness evaluation of cleanup techniques in ice-covered waters.**

According to a list of orders of the President of the Russian Federation on June 21, 2011 issued following a meeting of the State Council presidium in Dzerzhinsk, the Russian Government should have made amendments to the legislation of the Russian Federation designed to ensure environmental safety during

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implementation of infrastructure projects for exploration, production and transportation of hydrocarbons on the continental shelf of the Russian Federation and in its exclusive economic zone in compliance with international requirements and standards, through developing mechanisms for providing financial security for oil spill mitigation activities, as well as through establishing special regimes for the use of natural resources in Russia’s Arctic zone allowing oil production in icy conditions only if operating companies obtain proven response methods to clean up oil spills in ice-infested waters.

This order can be regarded as a progressive innovation that goes in line with President Putin's requirements, i.e. "an industrial project should comply with the most strict environmental requirements to be carried out in the Russian Arctic."

The OSRP for the Prirazlomnoe oil field has a mention of measures that imply using cleanup techniques and methods in ice-covered waters. But it is hard to call them proven as required by the order of the President of the Russian Federation, as there is no experience of collecting oil spilled under the ice. And Gazprom Neft Shelf has not conducted or organized trainings to test clean-up methods, outlined in the oil spill response plan for ice-covered waters.

In the OSRP, it is said, for example, that “in case of an oil spill in broken or solid ice it is very likely that oil will not float to the surface but keep spreading under the ice. In this case, an oil slick should be located by making search holes. After its contours are detected, a linear hole cut is to be made in the direction of the flow and ice should be removed from it. Following the flow, oil will move towards the hole cut and float up to the surface. Hole cut edges will prevent the spreading of oil. The floating oil should be cleaned up by skimmers “Minimax-60” and sorbents or burned”.

It is not mentioned in the OSRP, whether these methods are proven and comply with international standards. The OSRP for the "Prirazlomnoe" deposit lacks the following information (both for cleanup oil trapped under the ice and for mitigation activities in icy conditions):

- brush skimmers efficiency (may be required for removing oils and broken ice);
- efficiency of bucket skimmers and vessel mounted under-ice oil recovery system (when collecting oil in the broken ice, the skimming capability will obviously be limited by ice floes size);
- ice booms efficiency in icy conditions (these booms are known for their low efficiency: they are crushed by ice floes and do not perform their containing functions);
- grounds for boom length sufficiency (mentioned 300 meters) to encircle oil slick in ice-covered waters (maximum spill size - up to 10 000 tonnes);
- the effectiveness of skimming oil out of holes in the ice as well as of in-situ burning (it is known that in low temperatures the surface of holes is covering with ice faster than response teams can operate);
- the effectiveness of cutting out ice sections in this part of the Barents Sea (it is known as the area of intensive hummocking, the ice here is constantly moving and breaking, creating huge ice structures several kilometers in length and several tens of meters in width);
- risk assessment of stamukhi (a grounded ice rubble) formation in the area of the "Prirazlommaya" platform and, in case of such a risk, the assessment of their impact on the OSRP implementation;
- information about trainings in icy conditions organized to test the proposed technologies at the site of the “Prirazlommoye” deposit;
- the effectiveness of cutting slots in the ice to detect oil slick contour and skim the spilled oil (it is difficult to detect the flow direction form the surface of the solid ice as well as to predict the direction of an oil slick drift; besides, if the volume of a spill is large (at least several hundred tonnes of oil) it can be hard to cut a slot big enough to let all the spilled oil float to the surface;
• the size of the hole needed for the spilled oil to float to the surface in case of an under-ice spill, including a large-scale one (up to 10,000 tonnes).

The President's order implementation requires at least the analysis of international standards and international experience in conducting under-ice spill response trainings and courses. Without technology verification in real conditions of the Pechora Sea, the above data is very tentative.

To date, the only example of a real oil spill response operation in icy conditions is the clean-up of oil spilled from the grounded vessel “Godafoss” off the coast of Norway and Sweden in February 2011. Following the incident, around 100 tonnes of heavy fuel oil has been discharged to the environment. The container ship ran aground just around 50 km from Oslo, Norway's capital, and 150 km from Gothenburg, one of the largest Swedish ports. Two marine parks were affected by the spill: Norway's Ytre Hvaler National Park and Sweden's Kosterhavet National Park.

Norway has immediately sent two tugboats, two coastguard vessels and an oil-skimming ship to manage the spill. Sweden has sent three oil-skimming ships equipped with Lamor's most modern response systems. Clean-up operation was very active and Norway could use all possible resources to mitigate the spill.

60 cubic meters out of 110 cubic meters of spilled oil was collected by skimmer vessels. However, the remaining 50 cubic meters of oil was enough to contaminate 50 km of Norway's southern coastline.

Given there was infrastructure and the area of the spill was accessible to deliver necessary equipment, oil skimming in icy conditions showed 50% efficiency, which is far below the 100% claimed in the OSRP for “Prirazlomnoye” field.

Limitations and challenges related to work and response operations in ice-covered waters have been actively discussed in the United States. Though the highest official status these studies received in Canada, where the report commissioned by the National Energy Board (NEB) for the conditions of the Beaufort Sea and Davis Strait was released in 2011.  

The following parameters were asked to assess the limits:

• duration of daylight,
• air temperature, wind velocity, the presence of ice,
• wave height,
• clouds and visibility,
• vessel icing.

Considered 3 clean-up methods:

• localization and skimming;
• dispersants;
• in-situ burning.

3 https://www.neb-one.gc.ca/ll-eng/livelink.exe?func=ll&objId=702787&objAction=browse
The assessment of response capabilities for the Beaufort Sea concluded that in the period from November until May clean-up efforts would be impossible in case of the ice presence.

**Incorrect effectiveness evaluation of skimmers' performance in open water.**

Efficiency ratio of skimmers is estimated at 100% (full cleaning up of a 11,111 m$^3$ oil spill will take 111 hours using two skimmers with a capacity of 100 m$^3$/hour at an efficiency of 50% of nominal) (p. 14 of the OSRP).

Thus, the OSRP gives preference to mechanical clean-up methods that contradicts the world data on their effectiveness in mitigating major spills. After an accident on the Deep Water's Horizon platform in the Gulf of Mexico:

- 17% of oil was collected at the wellhead;
- from the sea surface was collected 16% of oil, out of which 3% was collected mechanically, 8% - using dispersants and 5% was burned;
- 16% of oil dispersed naturally;
- 25% - evaporated and dissolved;
- 26% - remained in the environment in the form of oil.  

In total only 3% of spilled oil was collected mechanically from the sea surface, which is much less than the amount anticipated in the OSRP for the *Prirazlomnoye* deposit.

According to the findings of the above mentioned report by the National Energy Board (NEB) for the conditions of the Beaufort Sea and Davis Strait and considering the same factors, the time period of inability to respond to a spill using mechanical technologies (localization and mechanical clean-up) for the Beaufort Sea was (% of time throughout a month):

- June – 20,
- July – 24,
- August – 41,
- September - 62,
- October – 85.

The skimmers' evaluated efficiency in open water of 50% of nominal is also a question. The real performance of skimmers is much lower due to weather limitation. For skimmers working in the Gulf of Mexico with more favorable weather conditions than in the Barents Sea, their efficiency did not exceed 30% of the tested capacity.

**Uncertainty with the time required for making decisions on the use of dispersants.**
As specified in the OSRP, oil dispersion technology should be applied in compliance with the Russian law, taking into account net environmental benefit analysis (NEBA) and after receiving the positive conclusion of the State Environment Impact Assessment.

However, the OSRP has no mention of the positive conclusion IEA obtained. To receive it, it might take months, which of course does not meet the need to respond quickly to an emergency spill.

**Lack of effectiveness evaluation as well as environmental impact assessment of in-situ oil burning.**

One of the methods to mitigate an under-ice oil spill, proposed in the OSRP, is in-situ oil burning. *In case of an oil spill in broken or solid ice it is very likely that oil will not float to the surface but keep spreading under the ice. In this case, an oil slick should be located by making search holes. After its contours are detected, a linear hole cut is to be made in the direction of the flow and ice should be removed from it. Following the flow, oil will move towards the hole cut and float up to the surface. Hole cut edges will prevent the spreading of oil. The floating oil should be cleaned up by skimmers “Minimax-60” and sorbents or burned.* The decision to use on-situ burning is taken by the Operations Management Office (OMO), Commission on Emergency Prevention, Response and Fire Safety together with Rosprirodnadzor (Federal Service for Supervision in the Use of Natural Resources) of Nenets Autonomous District (p. 15 of the OSRP).

The OSRP is missing the following important aspects:

- oil evaporates most intensively during the first few hours. Crude oil is very difficult to ignite after it starts mixing with water. The process of oil ignition is unclear, as the decision to do it will take time necessary to get approval from state authorities;
- the OSRP has a mention of an oil-burning device, but no information about its performance or possibility to use it on the ice;
- oil burning will cause high emission of soot, which will be deposited on the Arctic's icy surfaces, increasing the melting rate of snow and ice.

**Lack of detailed information about the location of landfills for oil-soil mixture disposal.**

According to the OSRP, *oil-soil mixture collected during the coastal cleanup operation should be taken to specially created polygons, their location to be determined by the Office of the Federal Natural Resources Oversight Service (Rosprirodnadzor) in the Nenets Autonomous District (NAD) and Administration of the NAD.*

However, it is not specified in the OSRP, whether the location is determined and, if it is not yet done, when it will be determined. According to Gazprom Neft Shelf, oil production has already started, meaning there is a risk of an oil spill affecting coastal areas. Unless the landfills' location is determined, this part of the OSRP is invalid.

**No evaluation of harsh environments the personnel might be working in.**

It is extremely important that the OSRP lacks assessment of extreme conditions the employees might face during spill response such as working in the open and ice-covered waters in the polar night and arctic winter. The Labour Code imposes restrictions on work performed:
4.2. Equipment sufficiency.

_Sufficiency of equipment for containment of a 10,000 tonnes oil spill._

_In case of a tanker accident with 10,000 tonnes of oil spilled, the initial calculated area of an oil slick will be around 1 km$^2$, the area of the thickest part of the slick (10% of the total area of the slick) will be around 0.1 km$^2$, while the semiperimeter will be 1,772 m respectively (pp. 13-14 of the OSRP Summary)._

However, to localize thick oil layers it is planned to use marine booms 800 m long, available onboard the two multipurpose icebreakers, which is obviously not enough to contain the thickest part of the slick.

Theoretically, it can be assumed that high booms (2000 mm height) can be delivered from Varandej. But as stated above, their delivery can take more than 4 hours, required for oil slick localization (in bad weather conditions shipping might be required — distance of about 60 miles).

Besides, according to the OSRP Summary (p. 20), there is only 400 meters of booms (2,000 mm height) in the coastal base in Varandej. In total (800+400=1,200 m) it is not enough to fully encircle the thickest part of the slick (1,772 m).

_Sufficiency of entrenching tools for the coastal cleanup._

According to the Feasibility Study of the _Prirazlomnoye_ oil field development, when implementing the OSRP for a regional-scale oil spill of 1,500 tonnes, the company is planning to use, on top of everything, 15 shovels, 15 buckets, 3 axes and a sledge-hammer. Cleaning is supposed to be done by 15 people (given the number of suits outlined in the same document).

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8 Summary 1. Of the feasibility study (FS-project) of "Prirazlomnaya" offshore ice-resistant platform (OIRP). 2. Of the group project for the construction of exploitation (producing and recharge) wells in the oil field "Prirazlomnaya" with OIRP. [http://www.shelf-neft.gazprom.ru/images/materials/%D0%A0%D0%B5%D1%84%D0%B5%D1%80%D0%B0%D1%82%20%D0%A2%D0%AD%D0%9E-%D0%BF%D1%80%D0%BE%D0%B5%D0%BA%D1%82%20%D0%B8%20%D0%93%D1%80%D1%83%D0%BF%D0%BF%D0%BE%D0%B9%20%D0%BF%D1%80%D0%BE%D0%B5%D0%BA%D1%82%20%D1%80%D0%B5%D1%84%D0%B5%D1%80%D0%B0%D1%82.pdf](http://www.shelf-neft.gazprom.ru/images/materials/%D0%A0%D0%B5%D1%84%D0%B5%D1%80%D0%B0%D1%82%20%D0%A2%D0%AD%D0%9E-%D0%BF%D1%80%D0%BE%D0%B5%D0%BA%D1%82%20%D0%B8%20%D0%93%D1%80%D1%83%D0%BF%D0%BF%D0%BE%D0%B9%20%D0%BF%D1%80%D0%BE%D0%B5%D0%BA%D1%82%20%D1%80%D0%B5%D1%84%D0%B5%D1%80%D0%B0%D1%82.pdf)
As it follows from the Scientific and Technical Work Report "Modeling of potential oil spill behavior when operating Prirazlomnaya OIFP", in case of a regional-scale spill of 1,500 tonnes, the company should be prepared for, 30-40 km of the coastline (for example, Dolgy Island) may be contaminated in a number of scenarios. The number of entrenching tools and personnel is clearly not enough to quickly and efficiently clean up dozens of kilometers of the coast.

**Sufficiency of lighting equipment.**

Four light masts complete with mini power stations should be used to illuminate the area of cleanup operations during the polar night (pp. 15, 20 of the OSRP).

As it follows from the Scientific and Technical Work Report "Modeling of potential oil spill behavior when operating Prirazlomnaya OIFP", in case of a regional-scale spill of 1,500 tonnes, the company should be prepared for, 30-40 km of the coastline (for example, Dolgy Island) may be contaminated in a number of scenarios. Four masts are clearly not enough for coastal cleanup operation in the dark.

**Sufficiency of equipment in case of simultaneous accidents in the area of the «Prirazlomnaya» platform and «Varandej» terminal.**

It is mentioned in the OSRP the possibility to bring rescue vessels and skimmers from Varandej port where the oil terminal of Lukoil is located. This will leave Varandej without relevant emergency support in case accidents at Varandej and Prirazlomnaya occur all at the same time.

5. **Efficiency of oil spills response activities in the area of the Prirazlomnaya offshore ice-resistant stationary platform: expert assessment by the Scientific and Methodological Centre "Informatika Riska".**

In 2012, experts of the Scientific and Methodological Centre Informatika Riska commissioned by Greenpeace Russia and WWF Russia made an evaluation of the OSRP efficiency for the Prirazlomnoye oil field.

Following the analysis of available materials, meteorological and other natural conditions for oil spill response activities in the Pechora Sea, spilled oil behavior as well as possible response activities, the experts concluded there were conditions that restricted response operations carried out by the forces specified in the OSR Plan for Prirazlomnaya rig and that reduced their effectiveness. The experts discovered and studied several scenarios, when it would be hard to prevent and effectively reduce the level of oil pollution in a number of important and highly protected areas.

Upon review of spilled oil behavior in open waters in various meteorological situations and response scenarios, the following conclusions were made:

1. It is not effective to contain a slick with floating booms deployed in the far distance from the source. Earlier «interception» of an oil slick increases the efficiency of booms, but the changeable nature of the flow does not allow to continuously collect oil.

2. The most effective way to deal with the major and long-lasting spill is to deploy floating booms as close as possible to the source, accumulate the maximum amount of oil (you can expect to contain 100-120 tonnes before the slick will be moved by currents), skim the trapped oil as fast as possible before the booms are deformed and then maneuver the vessels for boom redeployment. This cycle might take around 6 hours: 2
hours to deploy booms and accumulate oil, 2 hours for oil-skimming, 2 hours — to move to the new location of booms. It is possible to carry out two of these operations during daylight. Besides, additional time is needed to transport collected oil every 2-3 cycles. It is assumed that at least 4 ships should be involved: 2 - to deploy, hold and maneuver lines of booms, 1 - to collect the oil, 1 - for the shuttle transportation of oil from the skimmer to the platform.

3. In addition to the OSRP, the following can be recommended:
   • the most rapid mobilization of reserve line of booms and the respective vessels;
   • the use of mounted oil recovery systems for sweeping oil and loading it into an oil-skimming vessel as a tool to work in the condition of rapidly switching directions of the tidal current.

4. In case of spills described, rapid response allows to reduce the impact on the environment, but the aim of fully protecting nature reserves and significantly reduce their contamination can not be achieved.

5. Protection of protected areas by deploying coastal booms in a place where oil slick approaching a shoreline is not effective. The tactic of selective protection of pre-defined parts of the coast, based on the assessment of their comparative environmental sensitivity, may be recommended.

For spills occurring in ice periods, the following has been found:

1. Ice conditions and accompanying meteorological conditions that lead to rapid overlapping of an oil slick by dense ice, resulting in oil trapped in the ice, significant amount of it locating beneath ice and being forced up to the top of the ice.

2. We should admit that in this analysis we found no realistic ways to effectively mitigate the major oil spill in ice conditions in the short term to prevent oil from being trapped in surrounding ice flows.

3. Performance of all known technologies for oil spill response in the ice is not satisfactory to rapidly contain a major oil spill, even if significant accumulation of oil is detected. Oil spill response in ice conditions will require time and labor consuming efforts to monitor the state of a spill, to look for the largest oil slicks in various states, including those on top of ice, beneath ice and under snow.

4. Clean-up of oil trapped in the ice requires the use of air assets and ice-class vessels, specialized ice skimmers and mobilization of significant number of qualified workers.

5. The variety of possible circumstances, unpredictable accident conditions and spill behavior in ice make the advance calendar and resource planning of such operations hardly possible. However, this does not mean that reserves of necessary resources and equipment should not be created and replenished, that is likely to be one of the regional and federal objectives, which are beyond the scope of this study.

The objectives of this work does not include analysis of OSR technologies and/or giving recommendations on these issues. Based on the principle of the use of «best available technologies» (BAT), the only consideration on these issues may be a proposal to consider capacities of a wider range of special and proven technologies.

Considerations put forward for discussion are as follows:
1. Assuming limited usability of long floating booms, the present study is giving additional overview of the oil sweeping technology using vessel mounted oil recovery systems with short lines of fender booms and a skimmer fixed on board and delivering oil to an oil-skimming vessel. An example of such oil sweeping system are systems Lamor Side Collector LSC- 125 3C/5C30 with claimed efficiency at speeds up to 4 knots (in the simulation the speed of 2 m/s was set).

2. Given the limited number of technical means, it seems appropriate to accumulate them at the platform or onboard of rescue vessels, to the extent of reloading equipment from a leaving ship to the one left on standby. This is also important in terms of creating a reserve in case of failures of equipment, which endurance and reliability are uncertain quantities. Allocating part of the technical means in the port of Murmansk, as it is outlined in the OSRP, eliminates the possibility of their prompt use.

3. Given that capacities of a powerful oil recovery system to collect oil in ice conditions may be limited by insufficient inflow due to low temperatures and dense ice, it would be wise to explore the use of less productive, more mobile and relatively low-cost systems that work directly from the ship (for example, Lamor Recovery Bucket, rope-mop oil skimmers Oil Mop / Sea Mop). These systems can easily be transported and quickly reinstalled in the areas of local accumulation of oil. Analogs of these systems are proven in field tests.

4. Oil spill remote sensing and control are extremely important during polar nights. For example, the NOFO standard (Norsk Oljevernforening For Operatørselskap - Norwegian Clean Seas Association for Operating Companies, Norway) indicates that duty rescue vessels should carry oil spills detection and control systems that use marine X-band radars (8-12 GHz frequency, wavelength 2.5-3.75 cm). Modern systems are made as attachments to standard shipboard radars, they are all-weather and can work at night, sensing oil spills of more than 100 liters, at wind force 6 (Beaufort scale), in several nautical miles distance. Examples of oil spill sensing and control systems are OSD300033, MIROS OSD34 and some others.