

## **Key Facts and Analysis of the Reasons for the Winter Kill of Pacific Herring in Piltun Bay in Late May – Early June 2018**

On June 7, 2018, Sakhalin media reported that deceased herring were found on the shores of Piltun Bay. A survey of the area, conducted by Exxon Neftegas Limited marine mammal protection and monitoring specialists, also confirmed that many Pacific herring were found on the eastern and western shores of the central and northern parts of Piltun Bay. Exxon Neftegas Limited notified the Sakhalin Division of Rospirodnadzor (Russia's Federal Natural Resource Management Service); and, as a precaution, conducted additional inspections, which confirmed that all ENL production facilities were operating within all normal operating parameters. Subsequently, the fish were examined by specialists from the Okha Division of Sakhrybvod (Sakhalin Fisheries Management Agency) and the Okha District Administration. They concluded the fish kill occurred because of a lack of oxygen in the water. Results and surveys of the area did not find any traces of petroleum in the waters or in the fish.

A month later, on July 9, 2018, the Sakhalin Environmental Watch issued a press release stating that, "the company's industrial facilities may be complicit in the herring incident in Piltun Bay." Exxon Neftegas Limited thoroughly reviewed the findings presented in their report, reviewed all collected data, and involved scientific experts in the analysis process. The company and the scientists, who analyzed the situation, did not agree with the findings presented in the Sakhalin Environmental Watch report because their statements were speculative and lacked scientific support.

Specialists from Exxon Neftegas Limited analyzed all available objective data pertinent to the hydrodynamic activity of Piltun Bay (precipitation, tides, measurements of ice thickness, etc.). ENL also requested that scientists from leading Far East scientific institutes, who help the company plan and execute Sakhalin operations, become involved. The scientists presented two findings in the following papers (attached and available in Russian only):

- "Hydrometeorological and Hydrochemical Conditions of Piltun Bay in Spring (May) of 2018 (An Assessment of the Possible Influence of a Change in Ice Conditions on the Bay's Hydrological and Hydrochemical Regime)" – V.V. Plotnikov, Doctor of Geographic Sciences, Professor, Head of the Ice Research Laboratory at Pacific Institute of the Far Eastern Branch of the Russian Academy of Sciences, Professor in the Chair of Ecology and Natural Resource Management at Far Eastern State Fisheries Technical University; V.A. Dubina, Candidate of Geographic Sciences, Associate Professor, Pacific Institute of the Far Eastern Branch of the Russian Academy of Sciences; P.A. Tishchenko, Doctor of Chemical Sciences, Professor, Head of the Hydrochemistry Laboratory at Pacific Institute of the Far Eastern Branch of the Russian Academy of Sciences.
- "Regarding the Mass Herring Kill in Piltun Bay in May 2018" – E.R. Ivshina, Academic Secretary of SakhNIRO [Sakhalin Fishery and Oceanography Scientific Research Institute], Candidate of Biological Sciences; V.M. Pishchalnik, Head of the Earth Remote Sensing Laboratory at SakhGU [Sakhalin State University], Doctor of Engineering Sciences.

The papers prove that winter operations and the ice road built across Piltun Bay did not negatively impact the herring. The established facts and key findings of the scientists and ENL environmental protection specialists can be summarized in the following statements:

### **1) ENL winter pipeline repairs did not disrupt the water flow in Piltun Bay and did not negatively impact the herring in June 2018.**

- In winter 2018, in order to ensure the safety, integrity and reliability of the pipeline's operation ENL performed scheduled, preventive maintenance on a short segment of the subsea pipeline that links Odoptu facilities to the Chayvo Onshore Processing Facility.
- This maintenance was completed according to the approved plan, in compliance with environmental safety principles, and based on documentation duly approved by the authorized regulatory authorities.
- The pipeline operations involved the construction of an ice road and temporary protective cofferdams in order to install reinforcing, split coupling pipes. After safely and successfully completing five sections, all equipment was removed from this area on April 2, 2018.
- The ice road was about 6 km long, while the width of Piltun Bay at the pipeline crossing is about 10 km.
- The road's ice was 1.3 to 1.8 meters thick. This allowed sufficient space for the water to flow through the 4.5 meter-deep eastern channel. This is one of the two channels that links the northern part of the bay to the mouth. The second channel, located on the western side of the bay, was not crossed by the ice road. Monitoring confirmed that seawater did not flow over the ice surface during high tides, which would have signaled a blocked water channel.
- While building the cofferdams, water was continuously pumped out of them to prevent the cofferdams from flooding. This proves that obstacles to water circulation beneath the ice road did not exist.

- In winter 2008, a similar ice road that bisected the bay was used to construct the pipeline. Data collected from monitors showed no signs of an oxygen deficiency or of other significant changes in the waters of Piltun Bay. These findings confirm the effectiveness of Exxon Neftegas Limited's environmental protection measures and the absence of any relationship between the existence of the ice road and the oxygen shortage in Piltun Bay.
- Beginning on April 23, 2018, ice thickness decreased on the northern end of the ice road. This was consistent with multi-year observations and proves that the bottom channel remained open between the northern part of Piltun Bay and the bay mouth, allowing water to move freely.
- By the laws of hydrodynamics, the ice road across Piltun Bay did not block the bay channel or restrict water from naturally moving.
  - In reference to *Hydrometeorological and Hydrochemical Conditions of Piltun Bay in Spring (May) of 2018*, "According to the fundamental laws of hydrodynamics (mass conservation law), with the increase of ice thickness (including by some artificial accretion), the seasonal decline in the flow area in water exchange zones cannot result in a significant change in the flow volume, due to a proportional increase in its speed."
- Satellite images confirm water exchanges in Piltun Bay in 2018 were not restricted. The images show a decline in the ice sheet thickness, followed by ice breakup to the north of the ice road. This confirms that water continued to flow in the channel.
  - According to *Regarding the Mass Herring Kill in Piltun Bay in May 2018*, "The image also shows the frozen road's having no effect on this channel, since, if the road had been blocking off the channel, then to the north of the road there would be no opening in the ice formed by the continuous water exchange with the Sea of Okhotsk through the channel at an average estimated speed of 0.6 m/s, which is quite consistent with the geometric parameters of the watercourse itself."

## **2) The reason for the herring winter kill in Piltun Bay stems from the confluence of several natural factors.**

- Events like this are common in ice-covered, shallow water bodies similar to Piltun Bay, and are observed throughout the world. Examples of similar events have been observed and described previously in the waters of the Sea of Okhotsk and off the Sakhalin coast, including Piltun Bay in 1999.
  - According to *Hydrometeorological and Hydrochemical Conditions of Piltun Bay in Spring (May) of 2018*, "Indeed, the event of the mass herring kill in Piltun Bay in May 2018 is a classic case of a cumulative environmental effect, when a seasonal oxygen deficit is compounded by a number of other hardly predictable natural factors, resulting in a profound hypoxia of water."
  - In referencing *Regarding the Mass Herring Kill in Piltun Bay in May 2018*, "Analysis of the available scientific data, including the features of the Pacific herring population and the influence of natural factors on the hydrology in Piltun Bay, allows, with a significant degree of certainty, to suggest that this event occurred due to a confluence of natural factors. No cause-and-effect relationship can be seen between the existence of the ice road and the suffocation of the herring."

Exxon Neftegas Limited understands the ecological sensitivity of Northeast Sakhalin where the company's production facilities are located. The company remains committed to environmental responsibility. Exxon Neftegas Limited works with many globally recognized scientific experts and institutions in order to develop solutions that mitigate environmental impacts. Environmental recommendations from experts and institutions have been successfully implemented across Sakhalin-1 operations.

Understanding the concern of public environmental protection organizations in connection with the suffocation of herring in Piltun Bay, company specialists met with representatives of all stakeholders and presented information about the event, as well as findings from specialists.

During the investigation conducted by the State Environmental Protection Agency, Exxon Neftegas Limited provided transparent, detailed information about all operations. The investigation confirmed the company's strict adherence to environmental rules and regulations, and proved that Exxon Neftegas Limited did not violate any of them during operations, and that there is no correlation between ENL operations and the herring event.