REGIONAL ASSESSMENT OF OFFSHORE OIL AND GAS EXPLORATORY DRILLING EAST OF NEWFOUNDLAND AND LABRADOR
Technical Advisory Group (TAG) Session on *Cumulative Effects*
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QUESTIONS AND ITEMS FOR DISCUSSION
PARTICIPANT INPUT FORM

Name and Affiliation: Mark Brooks, WWF-Canada

1) Possible sources of cumulative effects

a) How should the inherently dynamic nature of the marine environment, including the continued influence of climate change and other such factors, be considered and addressed in the RA?

The RA timeline is too short to adequately consider and address the complexities of the cumulative impacts of 100 new exploration wells within the dynamic nature of the north Atlantic marine environment and a rapidly changing climate. As a point of comparison, the two offshore oil and gas Regional Strategic Environmental Assessments being carried out in the western and eastern Arctic regions have both lasted over two years. This RA process will be concluded within 6 months, with only 3 hours allotted to discuss complex and vital issues such as climate change, oil spills and cumulative effects.

Moreover, the premise of the cumulative effects assessment, as stated in the background document, is questionable and unsubstantiated. The document states that "the environmental effects of planned offshore exploratory drilling activities are often considered to be relatively low in magnitude and localized and short-term in nature, and therefore have a relatively limited environmental zone of influence." However, direct studies of natural recovery from drilling in deep water are lacking and the cumulative effects of multiple drilling wells are not well-studied.[1] In addition, climate change is already dramatically changing the marine ecosystem and this is expected to continue. Offshore exploration drilling will necessarily involve activities that will add significant disturbance and pollution in an ecosystem already suffering from warming and a rise in shipping traffic. Drilling will add another stressor into the environment through additional noise and pollution, vertical seismic profiling, as well as an increase in vessel traffic due to the offshore support vessels (OSVs) that are used to carry out different operations necessary for floating drilling rigs, as well as moored or fixed production platforms, thereby increasing conflicts with marine mammals. Disturbance of habitat, chronic leaks and spills add to the cumulative effects and the complex risk profile of offshore operations. Before any drilling takes place, more research is needed to better understand how cumulative effects and the changing marine environment can be managed.

Chronic pollution from offshore drilling rigs is a serious and ongoing problem. Because governments rely almost exclusively on pollution reports provided by the polluters themselves (who are subject to fines and other sanctions for spills), it is difficult to know for sure the true extent of the problem. A 2007 estimate by the European Environment Agency indicates that between 1 and 3 million tonnes per year of oil enters the global marine environment, of which 24 per cent is from marine transport (18 per cent from operational ship discharges and 6 per cent from accidental spills) and 3 per cent from offshore extraction.[2] More recent figures for oil discharges from offshore oil and gas installations indicate that 4,231 tonnes of oil (discharges and spills) entered the North Sea in 2014.[3]

In the Newfoundland offshore, there were 39 leaks reported to the Canada Newfoundland-Labrador Offshore Petroleum Board in 2011 amounting to more than 34,000 litres spilled, according to estimates provided by offshore

[1] Cordes, E. et al. September 2016. 'Environmental Impacts of the Deepwater Oil and Gas Industry: A Review to Guide Management Strategies. *Frontiers in Environmental Science*. https://doi.org/10.3389/fenvs.2016.00058

[2] European Environment Agency. 2007. *Europe's Environment—the Fourth Assessment*. European Environment Agency, Copenhagen.

[3] OSPAR Commission. 2016. *OSPAR report on discharges, spills and emissions from offshore oil and gas installations in 2014*. OSPAR Commission, London.

operators. The U.S. Bureau of Ocean Energy Management (BOEM) Environmental Impact Statement (EIS) for Oil and Gas Lease Sale 193 in the Chukchi Sea stated that, in the history of Alaskan offshore drilling "small spills (<1000 barrels) have occurred with generally routine frequency and are considered likely to occur from both Exploration and Development and Production activities."[4] While the BOEM speculates that most small spills would either evaporate or be contained by booms or absorbent pads, the EIS estimates that roughly 800 small spills would occur over the course of the 77-year production scenario.

In addition, in 2012 the Gulf Monitoring Consortium found evidence of non-reporting and chronic under-reporting of oil spills in the Gulf of Mexico,[5] a conclusion later validated by researchers at Florida State University in a peer-reviewed study who found that oil slicks from chronic leaks were typically 13 times larger than the estimates reported to the National Response Center in the U.S.[6] Researchers found that small oil spills — ranging from oil-drilling mishaps to ships discharging fuel — occur with surprising regularity, and tend to escape the public's attention that follows big spills.

Between October 1, 2010 and September 30, 2011, a total of 2,903 oil or refined petroleum spills were reported in the Gulf region. Seventy-seven per cent (2,221) of those reports did not include an estimate of the quantity of oil spilled. Forty-five per cent (1,311) identified a suspected responsible party – a strong indicator that those reports were submitted by the actual polluters – and of those, nearly half (620) do not include any spill amount.[7]

Of note, the Taylor oil spill in the Gulf of Mexico has been leaking an estimated 10,000-30,000 gallons of oil per day since 2004. By some estimates, the chronic leak could soon be larger, cumulatively, than the Deepwater Horizon disaster, which dumped up to 176.4 million gallons (or 4.2 million barrels) of oil into the Gulf. That would also make the Taylor spill one of the largest offshore environmental disasters in US history. It is difficult to know how much oil has been leaked since the beginning of the spill, although an estimate from SkyTruth, a satellite watchdog organization, put the total at 855,000 to 4 million gallons by the end of 2017.[8]

While the environmental impacts of a single small spill are likely to be minimal, the cumulative impacts of these many small spills and chronic leaks can be significant. Discharges of water-based and low-toxicity oil-based drilling muds and produced water can extend over 2 km, while the ecological impacts at the population and community levels on the seafloor are most commonly on the order of 200–300 m from their source. These impacts may persist in the deep sea for many years and likely longer for its more fragile ecosystems.[9] A range of biological effects can result from

[4] Bureau of Ocean and Energy Management. 2015. *Chuckchi Sea Oil and Gas Lease Sale 193.* https://www.boem.gov/ak193/
[5] Gulf Monitoring Consortium. 2012. *Report on Activities from April 2011 to October 2011.* http://gulfmonitor.org/wp-content/uploads/2012/05/Gulf-Monitoring-Consortium-Report.pdf
[6] Daneshgar Asl, S. et al. 2014. Chronic, anthropogenic hydrocarbon discharges in the Gulf of Mexico. Topical Studies in Oceanography. Vol. 129, pages 187-195. https://www.sciencedirect.com/science/article/pii/S0967064514003506
[7] Gulf Monitoring Consortium. 2012.
[8] Covington, R. December 29, 2017. *Taylor Energy Cumulative Spill Report – 2017 Update.* https://skytruth.org/2017/12/taylor-energy-site-23051-cumulative-spill-report-2017-update/
[9] Cordes, Erik E. et al. Environmental Impacts of the Deep-Water Oil and Gas Industry. *Environmental Science.* September 2016. https://www.frontiersin.org/articles/10.3389/fenvs.2016.00058/full

chronic oil inputs in coastal waters, ranging from localized and subtle to severe and long lasting.[10] In the UK sector of the North Sea there is evidence to show that the impacts of drilled cuttings (solid material removed from drilled rock, together with muds and chemicals) containing oil-based muds can persist for at least 6–8 years where cutting piles accumulate at the base of a drilling platform.[11]

Experiments into the impacts of sediments from offshore drilling activities, including large amounts of drilling cuttings have shown a significant reduction in number of taxa, abundance, biomass and diversity when cuttings were added to natural sedimentation thresholds.[12] [13] The disturbance caused by drilling has been shown to have an impact on deep-water megafaunal density and diversity, for example, with recovery and recolonization being only partial after 3 years, and the effects of such activities being still visible after a decade.[14] Colonies of the cold-water corals, *Lophelia pertusa*, have been identified around many oil and gas platforms in the northern North Sea,[15] and there is evidence to suggest that coverage of coral colonies by sediments, including cuttings from oil platforms, is sufficient to damage or even kill such colonies, despite their resilience to short-term sedimentation events.[16] [17]

Seismic

Seismic surveys and vertical seismic profiling can have serious deleterious cumulative effects on the marine environment. Anthropogenic underwater noise is a serious transboundary pollutant, which can negatively affect and degrade huge ocean areas. We know enough to have a legitimate reason to expect negative impacts severe enough to impact the health, welfare, and sustainability of at least some animal populations, from plankton through fish to whales.

To date 130 species have been documented to be impacted by human-caused underwater noise pollution.[18] The science to date suggests there can be serious negative effects on some important species, including plankton, benthic

[10] Dicks, B. & J. R. Hartley, 1982. The effects of repeated small oil spillages and chronic discharges. Philosophical Transactions of the Royal Society of London, Series B, Biological Sciences 297: 285–307.

[11] Henry, L.-A., D. Harries, P. Kingston & J. M. Roberts, 2017. Historic Scale and persistence of drill cuttings impacts on North Sea benthos. Marine Environmental Research 129: 219–228.

[12] Schaanning, M. T., H. C. Trannum, S. Øxnevad, J. Carroll & T. Bakke, 2008. Effects of drill cuttings on biochemical fluxes and macrobenthos of marine sediments. *Journal of Experimental Marine Biology and Ecology* 361: 49–57.
[13] Trannum, H. C., H. C. Nilsson, M. T. Schaanning & S. Øxnevad, 2010. Effects of sedimentation from water-based drill cuttings and natural sediment on benthic macrofaunal community structures and ecosystem processes. *Journal of Experimental Marine Biology and Ecology* 383: 111–121.
[14] Jones, D. O. B., A. R. Gates & B. Lausen, 2012. Recovery of deep-water megafaunal assemblages from hydrocarbon drilling disturbance in the Faroe-Shetland channel. *Marine Ecology Progress* Series 461: 71–82.
[15] Gass, S. E. & J. M. Roberts. 2006. The occurrence of the cold-water coral *Lophelia pertusa* (Scleractinia) on oil and gas platforms in the North Sea: colony growth, recruitment and environmental controls on distribution. Marine Pollution Bulletin 52: 549–559.
[16] Allers, E., R. M. M. Abed, L. M. Wehrmann, T. Wang, A. I. Larsson, A. Purser & D. de Beer. 2013. Resistance of *Lophelia pertusa* to coverage by sediment and petroleum drill cuttings. Marine Pollution Bulletin 74: 132–140.
[17] Larsson, A. I., D. van Oevelen, A. Purser & L. Thomsen. 2013. Tolerance to long-term exposure of suspended benthic sediments and drill cuttings in the cold-water coral *Lophelia pertusa*. Marine Pollution Bulletin 30: 176–188.
[18] Weilgart, L., 2018. *The impact of ocean noise pollution on fish and invertebrates*. Report for OceanCare, Switzerland.

organisms, whales, invertebrates, some fish species, narwhals, harbour porpoises, squid and shrimp. These impacts that can linger for months after the surveys have ceased. For some other species, we may not know the exact details of which organisms will be harmed by seismic airgun noise and to what degree. More research is needed and the precautionary approach should come into play for those species in which seismic impacts are unknown or uncertain. Sound underwater can travel thousands of kilometers under the right conditions, meaning that effects are not localized. Nieukirk et al. (2012) analyzed 10 years of underwater recordings from the Mid-Atlantic Ridge, finding that seismic airguns were heard at distances of 4,000 km from survey vessels and present 80-95% of the days per month for more than 12 consecutive months in some locations.[19] When several surveys were recorded simultaneously, whale sounds were masked (drowned out), and the airgun noise became the dominant part of background noise levels. These sorts of transmission distances do not occur in all cases, but without the appropriate noise measurements, it should be assumed they are possible. Overall, research suggests quite conclusively that the noise contribution of potential oil and gas development including seismic testing, drilling, and increased ship traffic from support vessels, is likely to be significant.

b) What type and level of future exploratory drilling should be assumed in the Study Area for the purposes of the cumulative effects assessment, and how should this be defined and approached (e.g., possibly through definition of various "scenarios" of future activity levels / intensities / distributions upon which to base the assessment)?

It should be assumed that roughly 100 new exploratory wells will be drilled in the Study Area as confirmed by the provincial government, and the future production is targeted to be roughly 650,000 barrels of oil per day, nearly triple current production levels.[20] This represents a significant increase in the risks from cumulative impacts, as well as carbon emissions.

c) What other types of human activities are affecting the marine environment in the Study Area, and are likely to have the most potential to result in cumulative effects in combination with offshore exploratory drilling?

The purpose of exploratory offshore drilling is to progress to production drilling. These two activities cannot be separated and must not be analyzed as activities that are independent of each other with respect to their cumulative effects. Moreover, human-caused activities (i.e. the burning of fossil fuels) are rapidly changing the marine environment through ocean warming and acidification due to climate change. These changes will also add to the cumulative impacts of exploratory drilling by potentially decreasing the resilience of the ecosystem. The development of additional offshore oil and gas related activities will result in an increase in vessel traffic due to the offshore support vessels (OSVs) that are used to carry out different operations necessary for floating drilling rigs, as well as moored or fixed production platforms. The OSVs not only help in exploration and drilling of oil but also for providing necessary supplies to the excavation and construction units located at the high seas. These vessels include: seismic survey ships, platform supply vessels (PSV), anchor handling tugs, anchor handling tug and supply vessels (AHTS), offshore construction vessels (OCV), ROV support vessels, dive support vessels, stand-by vessels, inspection,

[19] Nieukirk, S.L., Mellinger, D.K., Moore, S.E., Klinck, K., Dziak, R.P. and Goslin, J., 2012. Sounds from airguns and fin whales recorded in the mid-Atlantic Ocean, 1999–2009. *The Journal of the Acoustical Society of America*, *131*(2), pp.1102-1112.
[20] https://www.cbc.ca/news/canada/newfoundland-labrador/newfoundland-oil-plan-1.4541830

maintenance and repair vessels (IMR).[21]

As the number of ship voyages through the North Atlantic rises so do the risks to marine habitats, which many people rely on for food, livelihoods and cultural practices. If not properly managed, these new stresses could put ecosystems and cultures at risk. Conflicts with marine mammals, underwater noise, disturbance of ice habitat, heavy fuel oil, sewage and grey water, and oil spills are all part of the complex risk profile which industrial activities such as drilling bring to the marine environment.

2) Potential cumulative effects and their management

a) What factors and processes influence whether (and to what degree) the effects of individual projects and activities in the Study Area may overlap or otherwise interact to result in cumulative effects?

b) Are there particular environmental effects that are more likely than others to behave "cumulatively" in the Study Area? Are there certain environmental components that are more likely to be affected or are more sensitive to such cumulative effects?

c) Are there existing regulatory, planning or other mechanisms that help to ensure an adequate "degree of separation" between individual activities and their environmental effects in the Study Area?

[21] Encyclopedia of Marine Technology. Offshore Support Vessels. https://www.wartsila.com/encyclopedia/term/offshore-support-vessels-(osvs)

d) What recommendations could the Committee consider making in its report around how cumulative effects might be better managed through existing, enhanced or potentially new regulatory and planning processes?

The responsibility of the Canada-Newfoundland and Labrador Offshore Petroleum Board (CNLOPB) for environmental protection (including the management of cumulative effects) may be inappropriate given that the Board is primarily designed to ensure economic benefits from oil and gas, according to the Accord Acts.[22] The CNLOPB is in charge of issuing permits, conducting project reviews and overseeing safety and environmental issues once a drilling program is underway.[23] The explicit role of the CNLOPB, however, is to "facilitate the exploration for and development of petroleum resources" and members of both boards are primarily drawn from industry and government.[24] Investigations into previous offshore accidents, such as the BP Deepwater Horizon disaster in 2010 and the Piper Alpha explosion in 1988, have highlighted the critical importance of clearly separating the responsibility to help enable oil production from the need to manage safety and protect the environment from cumulative effects and other impacts such as oil spills.[25] [26]

An analysis of cumulative effects is encouraged but not currently required under existing legislation. The Committee could consider making this a mandatory requirement. In addition, use of a "best available and safest technologies" (BAST) requirement in the offshore oil and gas regulations would help to ensure that the operator meets a specified safety performance level while leaving less discretion for an environmental review panel to make judgments on what is a "reasonably practicable" risk reduction measure. BAST requirements are used in other jurisdictions to meet a specified safety performance level. BAST utilizes a performance-based approach to technology solutions but establishes a minimum standard that relies on consistent and verifiable testing and evaluation of a given technology's operational history, identifies candidate technologies (suggested by industry) for BAST determinations, then evaluates these technologies using consistent and verifiable testing protocols by a verified third party. The U.S. Outer Continental Shelf Lands Act (OCSLA) explicitly requires the use of "best available and safest technologies" on all new drilling and production operations, with only the secretary having the authority to determine whether the incremental benefits are "clearly insufficient" to justify the incremental costs of utilizing BAST.[27]

WWF-Canada recommends that thorough, long-term (over several years) studies be carried out to establish baseline data on the distribution and abundance of valued ecosystem components such as whales, harbour porpoises, cod, Greenland halibut, clams, mussels, squid, and shrimp, all of which are present in the area. The long-term impacts of seismic testing, together with threats such as climate change and ocean acidification, on the ecosystem and population biology should be thoroughly studied. Such studies are very challenging to carry out, but the burden of proof (to show no harm) should be on the project proponent, who wishes to alter the environment, rather than those wishing to preserve it.

[22] http://www.assembly.nl.ca/legislation/sr/statutes/c02.htm
[23] https://www.parl.ca/DocumentViewer/en/42-1/bill/C-69/first-reading#enH5920
[24] http://www.cnlopb.ca/about/mandate.php
[25] https://www.cbc.ca/news/canada/newfoundland-labrador/deepwater-horizon-commissioner-comparisons-to-nl-1.5253251
[26] https://www.govinfo.gov/content/pkg/GPO-OILCOMMISSION/pdf/GPO-OILCOMMISSION.pdf
[27] https://www.govinfo.gov/content/pkg/USCODE-2015-title43/html/USCODE-2015-title43-chap29-subchapIII-sec1347.htm

For seismic, the Committee should recommend that more research is required before exploratory drilling takes place and the precautionary approach should come into play for those species in which seismic impacts are unknown or uncertain. Existing science does not support the contention that seismic testing can be sufficiently mitigated such that the threats are substantially reduced. The mitigation options that currently exist are largely unproven in their effectiveness. The safety radius is not known with certainty and is very dependent on the sound transmission conditions which change with bathymetry, nature of the seafloor, salinity, and the sound speed profile which can change between seasons. There is not even good information as to what constitutes a "safe" exposure, particularly for whales whose hearing cannot be measured. This also varies between past exposure, recovery time, species, age and sex.

Finally, independent monitoring of drill rigs, tanker traffic monitoring, rigorous government permitting and inspection, and Citizens Advisory Councils are required to provide effective citizen oversight. Reducing risk requires several layers of corroborations and validations, which should flow from a social process that involves collaborations with representatives of the affected public, governments, commercial/industrial groups, civil society and Indigenous organizations.

3) Do you have any other input or recommendations that you would like to provide to the Committee on this topic?