

GENERAL COMMENTS

Nunatsiavut Government (NG)

Original Comment:

Within the 10-year authorization, what are the opportunities for adaptive mitigation based on new information and technology? What reporting requirements exist in order to ensure adaptive and effective mitigation over the 10-year time period with regards to fisheries impacts, marine mammal impacts, and impacts to Inuit subsistence activities? What power does the C-NLOPB or its stakeholders have to encourage the use of new techniques that are developed during the length of the program? For example, the Pacific and Western Arctic jurisdictions of Canada have used Section 13 of the Statement of Canadian Practice with respect to the Mitigation of Seismic Sound in the Marine Environment (Statement of Practice) to establish mitigations based on received levels of sound within the marine environment. This action was instituted because the minimum 500m was modelled and found to be insufficient to prevent harm to marine mammals in certain project areas.

Seitel Reply:

There will be full opportunity for adaptive mitigation during the 10-year program. Seitel will be required to prepare an EA Update document prior to commencing activities in any given year. The Update document will include new relevant information that was unavailable during preparation of the previous program document(s). If there are any new techniques developed during the 10-year period that may help to further mitigate environmental effects, they will be investigated and incorporated into the program if deemed useful.

NG Reply:

These comments were raised to bring forth the lack of impetus to improve mitigation once a 10- year authorization was approved. It was not answered.

Question: Specifically, how will new technology and mitigation practices be assessed? On an annual basis? Through literature searches?

Original Comment:

The cumulative effects impact assessment does not incorporate climate change and the subsequent impacts to the marine environment and associated VECs. As this is a 10-year environmental assessment, the impacts of climate change should be included in the assessment. In 2010, the Canadian Environmental Assessment Agency published a guidance document called Incorporating Climate Change Considerations in Environmental Assessment: General Guidance for Practitioners (<https://www.ceaa-acee.gc.ca/default.asp?lang=En&n=A41F45C5->

Seitel Canada Ltd. – Environmental Assessment of Seitel’s East Coast Offshore Seismic Program, 2016 to 2025 Addendum (LGL Limited August 2016)

[1&offset=1&toc=show](#)). This guidance document clearly outlines the importance of incorporating possible climate change impacts into the cumulative effects assessment. As a designated responsible authority under the Canada Environmental Assessment Act, the C-NLOPB is responsible to ensure proponents are following best practices not only in their operations but also in their environmental assessment practices.

Seitel Reply:

Seitel agrees that climate change is indeed a potential contributing factor to cumulative effects. From the perspective of greenhouse gases, atmospheric emission levels from the marine vessels and other relevant equipment that would be used during Seitel’s exploration program are considerably less than those associated with drilling operations. Regardless of this fact, there will be atmospheric emissions produced during the Seitel program. The Canadian Environmental Assessment Agency’s guidance document regarding the incorporation of climate change considerations in environmental assessment is of limited value in this case, primarily because a utile method of conducting assessment of cumulative effects has not yet been devised. Duinker et al. (2012), in their review of work to date on the scientific dimensions of cumulative effects assessment (CEA), concluded that it is particularly difficult to properly implement CEA in project-specific EAs. They made several recommendations regarding revisions to guidance materials for science in CEA, including the following:

- A much richer and nuanced conceptual framework for a cumulative effect is required in order to describe how effects become cumulative;
- Clearer guidance regarding CEA analytical methods is required; and
- Better definitions of thresholds, without which it is really impossible to judge the significance of cumulative effects.

Duinker et al. (2012) concluded by saying that lack of competent CEA impairs our ability to determine the degree to which particular activities jeopardize the sustainability of Valued Environmental Components (VECs), and that improvements in CEA practice are desperately needed.

NG Reply:

The proponent has focused on the emissions caused by their own project, however climate change should also be assessed based on the changes to the marine environment and by the cumulative effects of other foreseeable projects. The evaluation of cumulative effects involves evaluating the past, present, and future impacts of the project (CEAA, 2012, Ross, 1998) not evaluating the cumulative impacts on an annual basis.

Seitel Canada Ltd. – Environmental Assessment of Seitel’s East Coast Offshore Seismic Program, 2016 to 2025 Addendum (LGL Limited August 2016)

Question: Please provide the precedent or reference for the practice of assessing cumulative effects on an annual basis (outside of the C-NLOPB or the C-NSOPB). Also, please discuss how changes to the marine environment and other future projects will be incorporated into a cumulative effects assessment.

The NG reiterates its prior comment: “As an extension of the above, the amendment fails to properly address cumulative impacts. Proper cumulative impact assessments are required to fully assess the additive or multiplicative effects of potential projects. Therefore, forgoing assessment with the reasoning that the number of active projects is unknown, as stated on page 13 of the Amendment is unacceptable EA practice. The proponent should clearly state and assess the maximum number of potential projects within the extended temporal scope of their program. Although the NG prefers EAs with annual or bi-annual timelines, the annual EA Update process should only be used to update a robust cumulative impact assessment as more concrete information becomes available.”

Original Comment:

Paragraph 19(1)(a) of CEAA 2012 specifies that a project EA must take into account environmental effects, including cumulative environmental effects that are likely to result from the designated project in combination with other physical activities that have been or will be carried out. This environmental assessment does not clearly state the proponent’s scenario with which they are assessing their own cumulative effects of a 10-year program. The proponent states that the maximum possible combinations within each year are 2D and 2D or 2D and 3D; therefore section 5.8 should detail a scenario that includes one of these combinations each year for 10 years to assess cumulative effects.

Seitel Reply:

As indicated in § 5.8 of the EA, the EA has assessed cumulative effects within the Project and the residual effects described in § 5.0 include any potential cumulative effects resulting from the Seitel activities. The cumulative effects discussed in the EA that consider other activities outside of Seitel’s activities pertain to 2016 only. It isn’t possible to realistically consider cumulative effects for the entire 10-year period. The annual EA Updates will consider the cumulative effects in subsequent years. As indicated in the response to the NG General Comment #2, improvements in CEA practice are desperately needed.

NG Reply:

Since the proponent has stated that for them it is “not possible to realistically consider cumulative effects for the entire 10-year period,” it is the opinion of the

Seitel Canada Ltd. – Environmental Assessment of Seitel’s East Coast Offshore Seismic Program, 2016 to 2025 Addendum (LGL Limited August 2016)

NG that this project enters an annual or bi-annual review of the EA for the 10 year period.

However, it is possible to assess long-term cumulative effects based on the estimates of their own activities provided by the proponent (either 2D&2D or 2D&3D each year) in their project description and the list of known proponents and their activities on the C-NLOPB website.

More documentation and guidance is available for cumulative effects assessment than is referenced in the proponent’s response. Duiker et al. (2012) is a valuable review on the state of CEA guidance, however further work has emerged, specifically with reference to the Canadian Environmental Assessment Act of 2012. For example, the Technical Guidance for Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act, 2012 provides specific examples of setting past and future temporal boundaries, among other references to methodology. Duiker et al. (2012) also provides clear steps towards improved CEA, such as the use of GIS to map long-term planning for large areas. It may also be of assistance to review the cumulative effects assessments of projects that have a similar timeframe and have been able to perform a cumulative effects assessment (i.e. mines, pipelines, etc.).

Bidstrup et al., (2016), Noble, (2015) and Duiker et al. (2012) all emphasize the importance of Strategic Environmental Assessment to the assessment of cumulative effects. The Technical Guidance for CEA Effects under the CEAA 2012 also states that “Mitigation, monitoring and effects management are recommended (e.g., as part of an Environmental Protection Plan). These measures may also be required at a regional scale (possibly requiring the involvement of other stakeholders) to address broader concerns regarding effects on VECs.”

Monitoring programs from project-based EAs are therefore an important contributor to the strengthening of Strategic Environmental Assessments as well as to assessing project-based cumulative effects.

Question: Without a monitoring program at least based within their own project, how will the proponent assess total project effects and overall cumulative effects? How will the project impacts to SARA species be monitored and assessed against the EA’s impact predictions?

Seitel Canada Ltd. – Environmental Assessment of Seitel’s East Coast Offshore Seismic Program, 2016 to 2025 Addendum (LGL Limited August 2016)

Original Comment:

The maintenance of adequate separation of seismic projects is insufficient to reach a conclusion of “not significant” impacts to VECs. The concept of avoiding overlapping sound does not assess the impacts of diverted migration patterns or movements from multiple seismic projects, nor does it assess the impacts of multiple exposure events to VECs. Section 5.8.3 should detail the references and studies used to conclude that “any cumulative effects... will be additive (not multiplicative or synergistic) and predicted to be not significant.”

Seitel Reply:

According to Appendix 2: Types of Cumulative Effects of CEAA’s Technical Guidance for Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act (CEAA), although the cumulative effects of habitat loss, for example, can be considered to be additive, the cumulative effects on the species using the habitat may be synergistic (CEAA website; accessed May 2016). Therefore, the last sentence of the first paragraph on page 194 in § 5.8.3 of the EA should be changed from “Any cumulative effects (i.e., disturbance), if they occur, will be additive (not multiplicative or synergistic) and predicted to be not significant” to “Any cumulative effects are predicted to be not significant”.

NG Reply:

The proponent’s answer did not acknowledge the question. Please provide these references.

Question: Section 5.8.3 should *detail the references and studies* used to conclude that “any cumulative effects... will be additive (not multiplicative or synergistic) and predicted to be not significant.” Please provide these references.

Original Comment:

A major gap within the EA is the absence of a defined monitoring plan. A monitoring plan needs to be in place if they wish to provide new plans for each year. Clarification and details on the plan is requested from the proponent.

Seitel Reply:

A stand-alone monitoring plan per se is not typically required for environmental assessments of proposed geophysical programs. Types of monitoring that are typically included in geophysical program EAs are the employment of marine mammal/seabird observers (MMOs/SBOs) to monitor marine mammals and seabirds in the general vicinity of operations, and employment of Fisheries Liaison Officers (FLOs) to monitor commercial fishing/fishing gear/fishing vessels

Seitel Canada Ltd. – Environmental Assessment of Seitel’s East Coast Offshore Seismic Program, 2016 to 2025 Addendum (LGL Limited August 2016)

in the general vicinity of operations. Field reports are prepared and submitted for all of these monitoring activities. Seitel also commits to maintaining open dialogue with the NG and to have a NG MMO on the vessel.

NG Reply:

The definition of environmental assessment as per the Canadian Environmental Assessment Agency includes “a follow-up program to verify the accuracy of the environmental assessment and the effectiveness of the mitigation measures” (CEAA 2016). Monitoring plans are a very common component of an EA’s Environmental Protection Plan, especially when species at risk are present. Therefore, a monitoring program can and should be applied to this project. Sound source verification, marine mammal observers, and environmental monitors are common practice within seismic activities in North America.

Original Comment:

The EA states that DFO has not adopted any noise exposure criteria. With regards to the issue of preventing temporary threshold shift (TTS) and behavioral disturbance, the Western Arctic and Pacific Regions of DFO Canada have recommended precautionary noise exposure criteria within their advice provided to the National Energy Board. In the Western Arctic, criteria are based on 180 dB to avoid temporary threshold shift. It should be noted that seismic operations were successful in gaining their data when applying the mitigation recommended by DFO Western Arctic. In the Pacific Region, a safety zone is required to be modelled to correspond to 160 decibels is established to avoid behavioural disturbance (CSAS, 2014). This approach is based on Section 13 of the Statement of Canadian Practice with respect to the Mitigation of Seismic Sound in the Marine Environment that allows for incorporation of new mitigation measures based on sound variation in the environment as well as cumulative effects.

Considering the high number of potential projects in the area over the 10-year span of this EA, a precautionary approach to seismic mitigation for cetaceans and sea turtles is recommended. 500m is stated as a minimum in Section 2.2 of this environmental assessment. It is recommended that sound propagation modelling should be done to assess the potential impacts to marine life throughout the project area. It should be noted that the Statement of Practice is based on a 2004 CSAS document that outlines the large data gaps and potential consequences in seismic mitigation. It states that “risks of these consequences are poorly quantified, often unknown, and likely to be variable with both conditions of the environment and of the organisms exposed to the sounds.

Seitel Canada Ltd. – Environmental Assessment of Seitel’s East Coast Offshore Seismic Program, 2016 to 2025 Addendum (LGL Limited August 2016)

Seitel Reply:

While some case-by-case recommendations have been made by DFO for noise exposure criteria, currently there are no nationally-adopted noise exposure criteria. The EA proposes to use the protocols currently approved for use in offshore Newfoundland and Labrador. It should also be noted that the 180 dB re 1 μ Parms criterion to avoid temporary threshold shift (TTS) was established before there was any available information regarding the minimum received levels of sounds necessary to cause TTS in marine mammals.

The requirement of underwater sound propagation modelling was not indicated in the Final Scoping Document (C-NLOPB 2015) provided to the proponent by the C-NLOPB on 21 December 2015.

NG Reply:

The exposure criteria for DFO Western Arctic and DFO Pacific (clearly not nationally set criteria) were determined through Southall et al., 2007 and through the application of evolving mitigation based on environmental assessment monitoring plans. The academic studies of temporary threshold shift (TTS) and disturbance in marine mammals has evolved to assess specific groups and species. For example, Tougard, Wright, and Madsen (2015) found even lower TTS thresholds for smaller odontocete species at 100dB. The NG recommends the use of these types of studies within the EA.

With regards to SARA species, it is important to feed information both to a monitoring plan for the proponent, but also to the strategic environmental assessment of the area. It is important to reiterate that the 500m safety zone is a minimum requirement, and that the Statement of Canadian Practice with respect to the Mitigation of Seismic Sound in the Marine Environment encourages updates to mitigation with new scientific information. The Statement’s supporting document is from 2004 and cites major gaps in knowledge regarding offshore SARA species.

Question: The NG requests that the proponent outline the work on TTS and disturbance criteria since 2004 and justify (with references) why the 500m radius remains adequate in their opinion.

The reasoning that the sound source verification is not necessary because it was not included in the scoping document is not consistent with the proponent’s statement in Comment 1 that they will evaluate how they can improve mitigation and the incorporation of new techniques each year.

Seitel Canada Ltd. – Environmental Assessment of Seitel’s East Coast Offshore Seismic Program, 2016 to 2025 Addendum (LGL Limited August 2016)

SPECIFIC COMMENTS

Canada-Newfoundland and Labrador Offshore Petroleum Board

Original Comment:

§ 2.2.6 Seismic Energy Source Parameters, page 7 – The project description indicated a total volume of an airgun array ranging from 3,000-6,000 in³ and the project was scoped as this range, but the EA Report has the upper limit as 8,000 in³. Please clarify.

Seitel Reply:

During the period between submissions of the Project Description and the EA, Seitel decided it was necessary to increase the maximum value of total airgun volume. The official maximum value is 8,000 in³.

C-NLOPB Reply:

Please confirm that the EA included the effects assessment of airgun arrays up to 8,000 in³.

Fisheries and Oceans Canada (DFO)

Original Comment:

§Section 4.2.3 Fish and Fish Habitat Data Gaps Identified in Relevant SEAs, page 61 - regarding the last sentence in this section “*Any new information that has been made available since the two SEAs were completed...*” there are three SEAs referenced in this section, as such the last sentence be amended to make reference to “*...three SEAs...*”. Based on Section 5.2.2 of the Project EA Scoping Document it is not clear if (or how) the project EA has “*...described the relevance of such data gaps in the conduct of the EA*” this should be clarified.

Seitel Reply:

The last sentence of § 4.2.3 - Fish and Fish Habitat Data Gaps Identified in Relevant SEAs should be changed from “Any new information that has been made available since the two SEAs were completed is noted throughout § 4.2.” to “Any new information that has been made available since the three SEAs were completed is noted throughout § 4.2.”.

DFO Reply:

This comment was a two part comment while part 1 of the comment has been addressed the second part - “Based on Section 5.2.2 of the Project EA Scoping Document it is not clear if (or how) the project EA has ...”described the relevance of such data gaps in the conduct of the EA this should be clarified” – has not been clarified or addressed.

Seitel Canada Ltd. – Environmental Assessment of Seitel’s East Coast Offshore Seismic Program, 2016 to 2025 Addendum (LGL Limited August 2016)

Original Comment:

§ 5.7.4.1 Sound (Fish and Fish Habitat VEC) (page 154-157) – this section should include a short summary discussion (similar in detail to that provided for physical effects) of the potential behavioural effects in fish in relation to seismic sound (e.g. startle response; change in swim speed, depth and direction; schooling; reproduction; recruitment; feeding) that are reported in literature including among others - Popper and Hawkins 2012 Advances in Experimental Medicine and Biology Vol 730 - and other project EAs and applicable SEAs. This will also provide support to the linkage to the discussion on effects of seismic sound on Fisheries VEC presented in Section 5.7.5.1 of the EA Report.

Seitel Reply:

Studies suggest that effects on fish behaviour due to exposure to airgun sound are temporary in nature, and that response thresholds for various demersal and pelagic species are quite variable. Numerous studies have reported startle/alarm responses by fish (Pearson et al. 1992; Fewtrell and McCauley 2012). Pearson et al. (1992) also reported observations of localized distributional shifts, tightening of schools, and random movement and orientation. Løkkeborg et al. (2012) reported differences between species in terms of catchability after being exposed to seismic sound. They observed higher catches in gill nets but lower catches on baited hooks, possibly resulting from increased random movement by the fish causing a higher incidence of fish being caught up in gill nets but a lower incidence of fish targeting baited hooks. There is some thought that the degree of behavioural response by fishes to exposure to anthropogenic sounds such as seismic airgun sound depends on what natural behaviour the fish is exhibiting at the time of exposure. For example, fish exhibiting reproductive and/or feeding behaviour may have a higher response threshold to anthropogenic sound than fish exhibiting migratory behaviour. More study is obviously required to test this hypothesis. A more comprehensive discussion regarding the behavioural effects of exposure to seismic sound on fishes is contained in the appendices of recently completed seismic EAs (e.g., LGL 2015a,b).

DFO Reply:

The response is acceptable, however, rather than refer readers to an appendix in another seismic project EA for a “...more comprehensive discussion...” it is felt that the discussion should be provided (as an appendix) within the Seitel EA.

Original Comment:

§ 5.7.4.2 Vessel/Equipment Presence, page 159 – Although OBN use is predicted to have negligible / non-significant impacts on fish and fish habitat VECs it is felt (see above comment on Section 2.2.8) that subsequent annual project EA

Seitel Canada Ltd. – Environmental Assessment of Seitel’s East Coast Offshore Seismic Program, 2016 to 2025 Addendum (LGL Limited August 2016)

Updates should provide details relative to OBNs deployment (e.g. site coordinates, benthic habitat / substrate, water depth, presence of important benthic habitat features (e.g. sponge/corals, invertebrates species)) and any associated updated description of potential impacts and mitigations of potential impacts of OBN deployment on fish, fish habitat and sensitive areas. It should be clarified (either here or later in Section 5.7.9 Sensitive Areas VEC page 192) whether OBNs will be placed in sensitive marine areas and to what extent such placement is in keeping with regulations, accepted practices, restrictions and/or guidelines which may be in place governing activity within NAFO coral closure areas and/or other marine sensitive areas.

Seitel Reply:

Seitel will not be deploying OBNs in its Project Area in 2016. If and when Seitel decides to use OBNs, physical and biological characteristics of the deployment area as well as descriptions of potential impacts and associated mitigations will be provided in the EA Update for that particular year. As indicated in Table 5.3 regarding the Fish and Fish Habitat VEC, the mitigations associated with the deployment of OBNs include a relatively small footprint and a short deployment time. These two mitigations also apply to the Sensitive Areas VEC, depending on the primary characteristics of the ‘sensitive area’. For example, if occurrence of corals is a primary reason for an area being categorized as ‘sensitive’, then the proponent will have to conduct sea bottom surveys prior to deploying any OBNs.

DFO Reply:

This comment was also a two part comment and while the response clarifies whether OBNs will be placed in sensitive marine areas, the response does not clarify the second part of the comment that being “...and to what extent such placement is in keeping with regulations, accepted practices,, restrictions and/or guidelines which may be in place governing activity within NAFO coral closure areas and/or other marine sensitive areas...”

C-NLOPB Reply:

If the proponent plans to use OBNs in conjunction with towed streamers during surveys planned for 2017 – 2025 then the potential impacts of this activity should be included in the EA. The purpose of an EA Update is not to provide an assessment of potential impacts of new activities but to confirm that the proposed program activities fall within the scope of the previously assessed program and to validate EA predictions.

Seitel Canada Ltd. – Environmental Assessment of Seitel’s East Coast Offshore Seismic Program, 2016 to 2025 Addendum (LGL Limited August 2016)

Nunatsiavut Government (NG)

Original Comment (From the C-NLOPB):

§ 2.2.6 Seismic Energy Source Parameters, page 7 – The project description indicated a total volume of an airgun array ranging from 3,000-6,000 in³ and the project was scoped as this range, but the EA Report has the upper limit as 8,000 in³. Please clarify.

Seitel Reply:

During the period between submissions of the Project Description and the EA, Seitel decided it was necessary to increase the maximum value of total airgun volume. The official maximum value is 8,000 in³.

NG Reply:

The shifting of the gun size from a maximum of 6000 in³ to 8000 in³ is significant and should be reassessed within the EA.

Original Comment:

§ 5.9 Mitigation Measures and Follow-up, pages 195 to 197 – this section outlines the mitigation measures in regards to a marine mammal or sea turtle occurrences within 500m of the array. Please clarify if 500m will be used as a minimum standard as recommended by the Statement of Practice and cited in Section 2.2. Please also further define scenarios within marine mammal mitigation with regards to what happens in low visibility and outline the discretion that MMOs have within the shutdown process.

Seitel Reply:

Five hundred metres will be used as a minimum standard. In accordance with other seismic monitoring programs offshore Newfoundland and Labrador, no additional measures apply during periods of low visibility. MMOs have full authority to declare a shutdown. Highly experienced MMOs are needed on seismic vessels in order to accurately identify marine mammals to the species level, be aware of the status of species and the associated shutdown requirements, and to accurately estimate the distance of ‘shutdown’ species from the vessel using the best available tools.

NG Reply:

The proponent states that 500m will be the minimum standard for a safety zone shut down.

Question: What other standards will be used for other situations? Will they be applied to high-probability habitat? A monitoring plan could assess the amount

Seitel Canada Ltd. – Environmental Assessment of Seitel’s East Coast Offshore Seismic Program, 2016 to 2025 Addendum (LGL Limited August 2016)

of time spent in high probability habitat in low visibility and aid in future planning to decrease potential impacts.