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Demande ou Question:

La commission désire obtenir les paramètres de modélisation utilisés pour simuler les effets sonores du projet à la pointe ouest de l'Île Verte, notamment en condition d'inversion thermique, de brouillard et d'absence de vagues. La commission souhaite aussi que vous précisiez si vous avez tenu compte de l'atténuation du son sur l'eau par rapport à celle sur la terre ferme.

Réponse:

The noise assessment was conducted according to MDDEP methodology and internationally accepted standards. Since parameters affecting outdoor noise attenuation can be highly variable (for example: noise sources, weather and ground conditions), these methods state that conditions to be examined should be either annual averages or those that will occur a significant portion of the time that people may be affected. For the Cacouna Energy assessment, the selections for calculation variables were, based on our professional judgement, adequately conservative in order to present a representative worst case determined by the range of ambient conditions. The selections made for the analysis at Isle Verte as presented during the hearing represent our judgment of an additional conservative scenario that could intermittently occur.

The following are key parameters used in the Cacouna Energy noise assessment that affect attenuation from the atmosphere and from the ground surface:

- atmospheric effects included temperature and humidity;
- the calculation method in the EIS used a moderate temperature inversion effect (as stated in ISO 9613-2: 1996);
- the calculation method for the Isle Verte special case used a moderate-high inversion effect based on atmospheric stability class;
- for the EIS, the absorption characteristics of the ground were set for a firm surface with minimal absorption;
- for the Isle Verte special case , the absorption characteristics of the ground were set for a hard smooth surface with no absorption (smooth water); and
- sound generated by waves was not included in the assessment.

Detailed technical descriptions for atmospheric and ground surface factors used in the CadnaA models are included in the following discussion.

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Temperature and Humidity

There are two weather variables that are entered into the model for atmospheric effects: temperature and humidity. The values used for all Cacouna Energy Project models were an average temperature of 10 degrees Celsius and 70 % humidity. These are considered conservative since this combination tends to promote sound propagation, thus reducing the amount of sound attenuation over distance (ISO 9613-2:1996, Section 7.2).

Temperature Inversions

The CadnaA model used for the EIS uses the ISO 9613 standard for outdoor noise calculation. This standard provides formulae for various attenuation factors such as atmospheric effects and ground absorption. For the determination of attenuation due to the atmosphere, the document provides a set of equations that equivalently hold for both a slight downwind condition and moderate temperature inversion conditions (ISO 9613-2:1996, Section 5).

Additional analysis on the effects of thermal inversion for Ile Verte was presented during the hearings (file D4, 650). This analysis used the CONCAWE method for atmospheric effects which is based on Pasquill-Gifford atmospheric stability classes (CONCAWE 1981). Parameters used in the model were a moderate thermal inversion Class E during calm winds. Temperature and humidity factors remained the same as for the EIS.

The EIA modelling did not differentiate the tendency for thermal inversion to exist over water from over-land conditions. This is part of the reason why the noise contours presented show no difference in sound propagation between ground and water areas. This resulted in a more conservative assessment for the nearer receptors to the project.

Sound can be perceived as carrying farther during fog since fog is associated with thermal inversions which are discussed above. This is why fog was not addressed as a separate issue in the EIS. The higher humidity during fog tends to increase noise attenuation so fog was not considered a worst case.

Inversion conditions, particularly those over water, are highly variable and not easily predicted. The acoustical effect of each inversion will depend on the height of the inversion, the temperature differences at various elevations and the distance of the source to the receiver (the higher the inversion, the farther the inversion effect will carry). This complexity is not represented in the standard methods cited.

Ground Attenuation

For ground attenuation, the factor in the model may range from 0 (highly reflective surface) to 1 (soft absorbent surface). For the EIS a factor of 0.3 (firm surface, minimal absorption) was used over the study area. Ground attenuation effects were not differentiated between water and earth in the modelling due to the resulting complexity of

the model. This is the second reason why the noise contours presented show no difference in sound propagation between ground and water areas. In this case, the focus for variable selection was on the nearest and thus potentially most affected receptors.
For the specific analysis done for Ile Verte as presented during the hearings, the ground attenuation factor was changed to 0.1 in order to represent the sound propogation over smooth water.

Wave Generated Sound
Sound from wave action is not included in the assessment. As stated during the hearings (File D4, line 635), the baseline measurements were conducted in winter when there was very little natural sound and the island was surrounded by ice. Baseline noise levels are expected to be higher most of the year due to wildlife and wave generated noise, particularly during times when people are out-of-doors or have windows open. In addition, sound from waves was not added to the modelling as a noise source.

References:

ISO 9613-2:1996 International Standards Organization Standard 9613: Determination of Sound Propagation Outdoors, Part 2. Stockholm, 1996.

CONCAWE, 1981. The Propagation of Noise from Petroleum and Petrochemical Complexes to Neighbouring Communities. Brussels, 1981.