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Projet de construction du poste Saint-Jean à 315-25 kV et d'une ligne d'alimentation à 315 kV à Dollard-Des Ormeaux
6211-09-067

**Hydro Quebec**

**Project for the construction of Saint-Jean substation at 315-25 kV and of a 315 kV supply line at Dollard-Des Ormeaux**

**Public hearings – second part**

**May 17 2016**

# NOISE FROM THE HIGH-VOLTAGE POWER LINE AND STATION

Brief prepared by

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# 1. INTRODUCTION

The purpose and main objective of this brief (memoire) is to express my concerns associated with the Hydro Quebec project regarding the refurbishing of the Saint-Jean substation (or station, for short) and its conversion to 315/25 kV, and the installation of a new 315 kV supply line, both on the Hydro Quebec servitude at Dollard-Des-Ormeaux.

The project implies two future phases, defined with respects to the currently existing situation in which a 120kV line supply the station, where the voltage is transformed to 12kV for power distribution to the residents in the area served by the station post. The two phases are:

- Future initial phase, in which the new line at 315kV will be installed, while in parallel the (new) station will be equipped with two 25 kV transformers, each supporting 140MVA.
- Future limit (or final) phase, in which two more transformers with the same capacity will be added, while in parallel dismantling the existing 120kV line and removing the 12kV equipment.

My concerns are primarily related to the electromagnetic field (EMF) generated by the projected high-voltage / high capacity (current) line, and also to the noise pollution from the projected line. They are expressed in the form of analyses intended to unveil less-evident implications from these offenders. In particular, the memoire provides new perspectives into the interpretation of the noise evaluation results provided by Hydro Quebec (the promoter). These are preceded by the introductions of a few elements intended to provide the context for noise analyses.

More specifically, the memoire addresses the following aspects:

- Electrical power considerations, as premises for noise evaluation
- Global vs. tonal noise values and noise perception
- Measured and simulated noise values
- Municipal Bylaws on Noise

Throughout this memoire the quotations from the project documents are in French, in order to prevent potential translation errors. A given graphs from a project documents may be reproduced in multiple sections of this memoire, in support of different analyses and also for convenience.

# 2. NOISE CHARACTERISTICS

## 2.1 The Noise Associated with the Saint-Jean Station

The noise in the vicinity of the substation is produced primarily by the mechanical vibrations triggered by powerful alternative currents / stray magnetic fields in the transformers, then by the maneuvers associated with the disjoncteurs (circuit breakers) in the substation, and finally by the incoming and outgoing power lines operated at high voltage / 60 Hz.

The noise manifests itself as a buzz (bourdonnement), which depends on the applied voltage. Because the magnetic flux density is strongest twice every electrical cycle, the buzz frequency is twice the voltage frequency, i.e. 120Hz, with harmonics caused by the non-linear behavior of the magnetic materials, gradually decreasing in frequency. Occasional noise produced by the disjoncteurs is added to the buzz. An example of the electrical noise in the vicinity of a power station is illustrated in Figure 2-1 (from the response to QC-20 in [RD-01]).

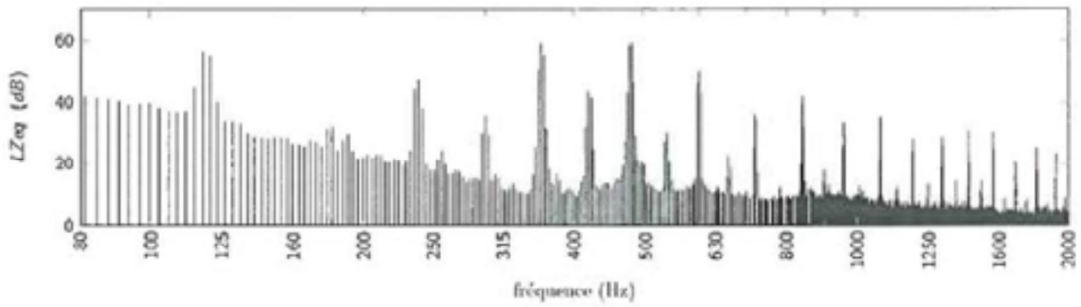


**Figure 1– Spectre obtenu à 10 m d'un poste électrique 315 – 25 kV**

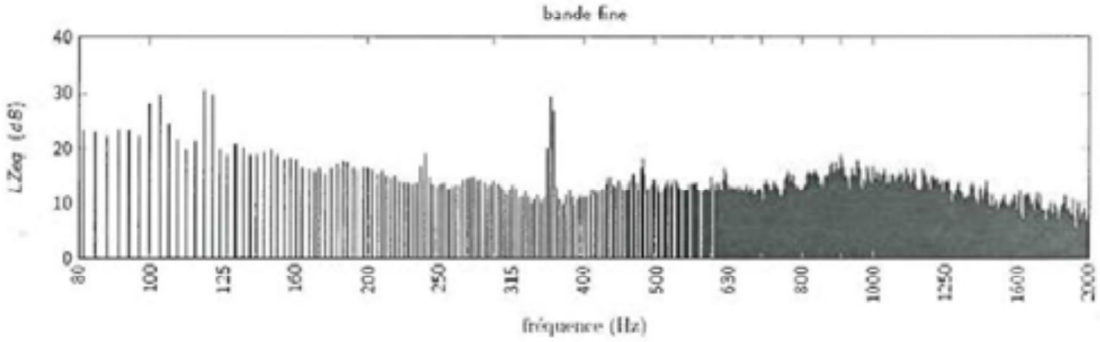


**Figure 2– Spectre du poste de la figure 1 obtenu à 1300 m. Notez que le poste était audible à cette distance.**

**FIGURE 2-1. EXAMPLE OF THE NOISE GENERATED BY A POWER STATION**

## 2.2 The Noise Associated with the New 315kV Supply Line

The audible noise emitted from high-voltage power lines is caused by electrical microdischarges that occur when the electrical field on the conductor surface is strong enough to start a flow of electric current (arc) through the air surrounding the conductor (Corona effect/loss). The probability of such discharges is higher for larger conductors with surface irregularities.

Depending on the atmospheric/air conditions (wet or dry), the noise can manifest itself in different forms, from buzz to sharp crackling. The noise is typically broadband in nature, with tonal notes at 120 Hz and harmonics thereof, gradually decreasing in frequency. This is due to the fact that the arcs almost always occur twice in each 60 Hz sine wave cycle, near the peaks of the electrical field. Since the high voltage lines involve multiple phases, a smoothing effect take place, spreading the spectrum, while individual tones can still be discerned, as noticed/measured on existing high-voltage lines.

## 2.3 The Ambient Noise

The ambient noise includes components from multiple sources, such as the noise from the adjacent roads and highway 40, the noise from the song of birds and insects (especially crickets), the noise from humans and commercial activities in the vicinity of the post and of the servitude of the projected line. The noise is rather broadband in nature, peaking in the middle of the audible spectrum in logarithmic representation (around 1000kHz).

The noise produced by the station and the projected line overlap the ambient noise. An example

of the line projected/simulated noise, superimposed over the measured ambient noise, is illustrated in Figure 2-2, taken from [RD-02].

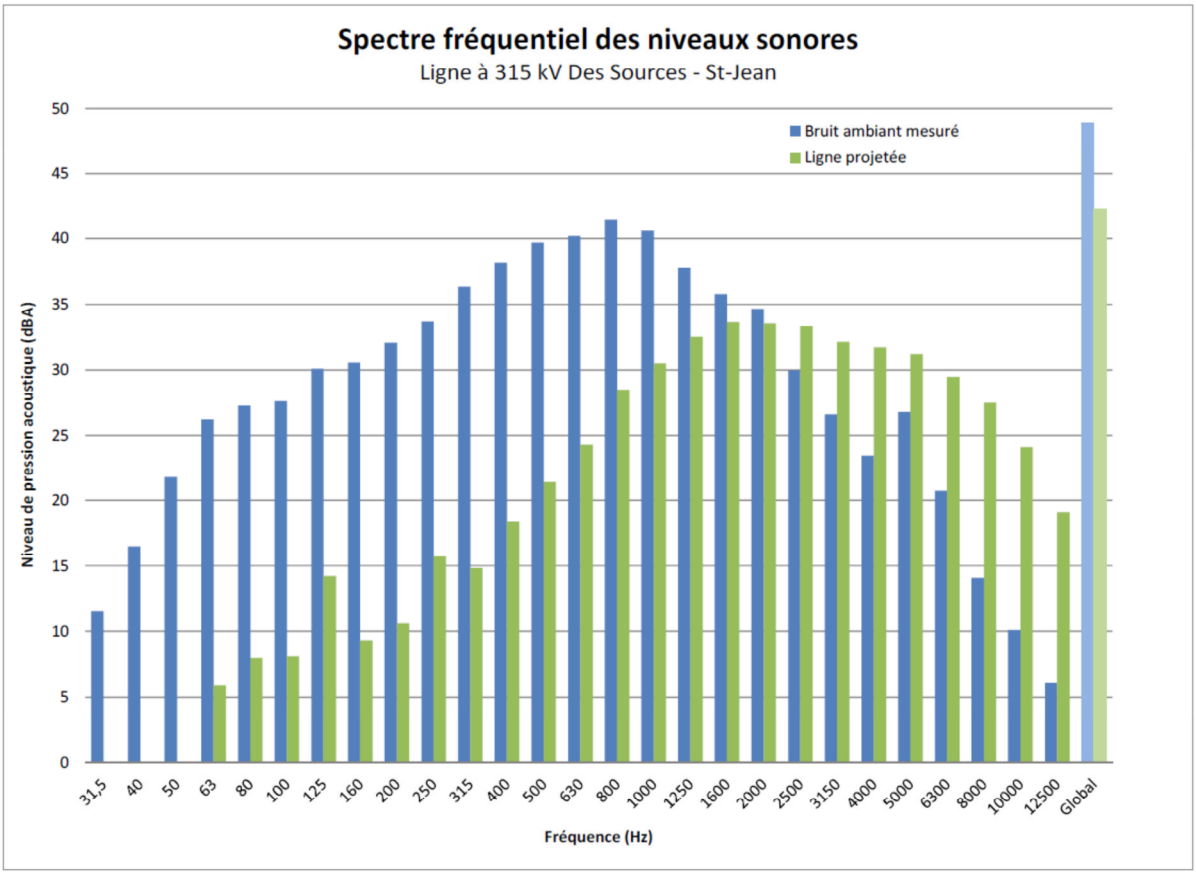


**FIGURE 2-2. EXAMPLE OF THE NOISE GENERATED BY A 315KV LINE, SUPERIMPOSED ON THE AMBIENT NOISE**

# 3. NOISE ASSESSMENT METHODOLOGY

Noise assessment is in general based on measurements and model-based simulations. The combination of measurements and simulation results are slightly different for the assessment of the noise generated by the Saint-John station and the noise generated by the projected line.

## 3.1 Noise Assessment Methodology for Saint-John Station

The methodology used by Hydro Quebec to demonstrate the acoustic conformance of the new/refurbished Saint-Jean station consists of the following steps:

- The analysis of municipal, provincial and Hydro Quebec noise requirements/criteria, including those specified in the municipal bylaw B-3, the provincial instructions note 98-01 of MDDELCC and HQT norm TET-ENV-N-CONT001
- Evaluation of the acoustic power of the present power transformers
- Measurement of the ambient noise around the post, more specifically in 10 points including those in the vicinity of the most vulnerable zones (residential uni-familial)

- Simulation of sound propagation around the post for the present and future conditions (N.B. The future conditions refer both to the initial phase, with the 120kV/12kV equipment in place and operational, and to the final phase, after dismantling the 120kV/12kV equipment)
- Evaluation of the conformance of the new station, by comparing the acoustic levels at the evaluation points with the applicable requirements/criteria

After completing the above steps, Hydro Quebec demonstrated conformance (with some margins) of the Saint–John station for present and future conditions, against the most severe criteria of all those considered, namely the HQT norm TET-ENV-N-CONT001 [RD-05]:

- 46 dB A (LAr) aux résidences unifamiliales à l'ouest et à l'est du poste;
- 50 dBA (LAr) aux maisons en rangée, situés au nord du poste.

It is noted that the future initial phase conformance can only be achieved by installing sound-absorbing walls and couvertures around the new 315kV-25kV transformers, as per Hydro Quebec recommendations.

## 3.2 Noise Assessment Methodology for the 315kV Line

The methodology used by Hydro Quebec to assess the noise generated by the projected 315kV line and to demonstrate its conformance with existing requirements is similar but not identical to that used for the Saint-John station. It is based on the following steps:

- The analysis of municipal, provincial and Hydro Quebec noise requirements/criteria, as applicable to different weather conditions
- Measurement of the sound profile for the ambient noise in 4 points along the De Salaberry corridor between Des Source substation and Saint-John substation, representative for different zones
- Evaluation, by simulation, of the acoustic power generated by the projected 315kV line
- Evaluation of the noise level at sensible points along the corridor hosting the new line, by simulations based on a sound propagation model
- Analysis of the acoustic conformity of the 315kV line, by comparing the estimated acoustic levels at the evaluation points with the most stringent requirements/criteria, namely Annex E in [RD-05]:
  - Aux résidences longeant l'emprise de la ligne projetée:
    - 46 dBA (LAr) lorsque les conducteurs sont secs
    - 49 dBA (LAr) lorsque les conducteurs sont mouillés
  - Dans l'emprise de la ligne projetée, notamment sur la piste cyclable:
    - 55 dBA (LAr) pour toutes conditions

## 3.3 Use of Weighting Filter for Noise Assessment

As already stated, noise assessment is achieved by measurements for existing lines and equipment, and by measurements and model-based simulation for future/projected lines and stations. The measurements / simulation models typically involve a weighting filter used to emphasize or suppress some spectral components of the noise. Various weighting functions (e.g. A-weighting, B-weighting, C-weighting and D-weighting) have been proposed and used for various fields of audio measurements.

For environmental noise measurements/evaluation, the A-weighting curve, defined in the norm CEI 61672-1 [RD-03], has been commonly used by various organisms / electricity producers/distributers, especially in North America and Canada (including Quebec). The A-curve is said to capture the "equal-loudness contours" reflecting the average frequency sensitivity of the human ear.

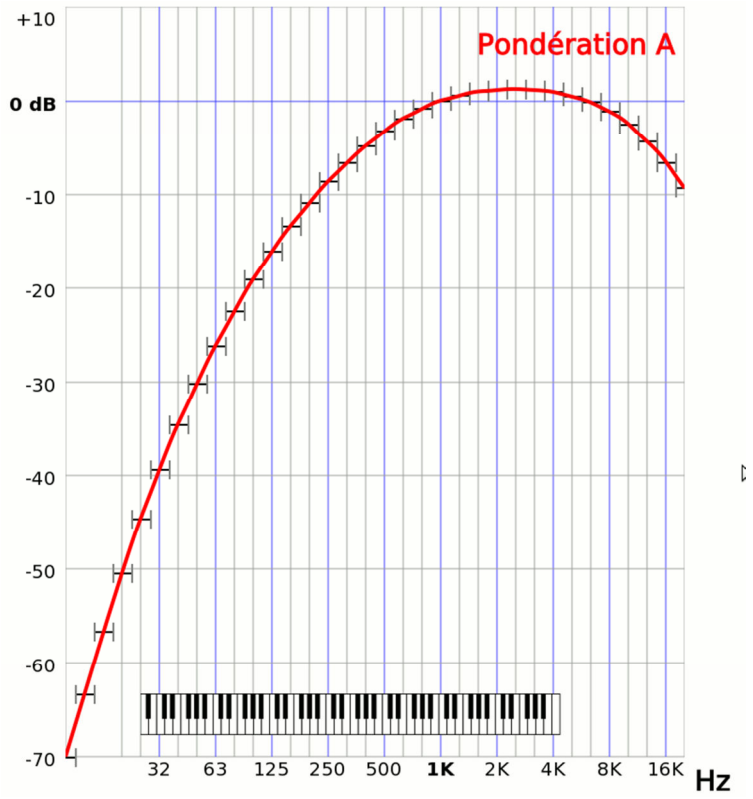


**FIGURE 3-1. A-WEIGHTING FILTER**

The results of noise level measurements/evaluation based on A-weighting curve are expressed in A-weighted decibels, abbreviated as dBA. The dBA is defined with respect to a Sound Pressure Level (SPL) of 20 microPascals at 1 kHz, taken as reference, i.e. 20 microPascals correspond to 0 dB SPL or 0 dBA.

A-weighting filtering is widely used for noise measurements and also as a basis for comparing different approaches/solutions for power transportation and distributions, but it is often forgotten that the curve relates only to the subjective loudness of pure tones (the illustration of a keyboard at the bottom of the figure can be interpreted as a reminder). Its adequacy for the measurement/evaluation of the noise associated with the power lines is therefore being challenged, and there are many voices claiming its obsolescence and replacement with more realistic measurements of noise levels [RD-06].

For both measurements and simulations, the A-weighing curve emphasizes frequencies in the 1kHz-6kHz range, while suppressing lower and higher frequencies to which the ear is less sensitive. This does not necessarily mean that components at these frequencies do not exist in the noise generated by the power lines; they can still be heard, depending on their level (before weighting) and individuals' ear sensitivity.

# 4. NOISE EVALUATION RESULTS: NEW PERSPECTIVES

The noise study for the projected 315kV line and the Saint-John has been conducted with high professionalism. However, some premises and the interpretation of some results may be regarded from more than one perspective, given the subjectivity of noise perception by humans.

To set the scene, the exploitation conditions of the projected 315kV line, as used in the study for noise evaluation and also for the calculation of the electromagnetic field (EMF)), will be reviewed first in terms of electrical power and current. This will be followed by considerations regarding the use of global values versus tonal values for noise, a comparison between noise level results from measurements and simulation, and some interpretation of the noise norms/criteria used for conformance evaluation.

## 4.1 Electrical Power Consideration

Initial information

The first indications regarding the electrical power assumptions made by Hydro Quebec for the Saint-Jean station project are provided in the following paragraph from section 1 in Annex E of Volume 2 of the Impact Study [RD-05]:

*Hydro-Québec TransÉnergie (HQT) projette de construire un nouveau poste à 315-25 kV en partie sur le site du poste Saint-Jean actuel. Le projet prévoit, à son étape initiale, l'ajout de 2 transformateurs de puissance à 315-25 kV 140 MVA. Par la suite, les équipements du poste actuel (120- 12 kV) seront mis hors tension et démantelés. Le projet prévoit également l'ajout des transformateurs de MALT associés aux transformateurs de puissance et l'installation de 2 disjoncteurs à 315 kV isolés au SF6. Les autres éléments du projet n'ont pas d'incidence sur le bruit émis par le poste. La configuration ultime du nouveau poste comporte 4 transformateurs de puissance à 315-25 kV 140 MVA et 3 disjoncteurs à 315 kV isolés au SF6.*

Regarding the current situation we learn from section 2.1 in [RD-04]:

*Le poste Saint-Jean est un aménagement de type extérieur qui comprend deux sections reliées entre elles, à 120 kV et 12 kV, respectivement. La section à 120 kV comprend quatre transformateurs à 120-12 kV de 33,3 MVA. Le poste Saint-Jean est alimenté par une ligne biterne à 120 kV provenant du poste de Saraguay (circuits1253-1254).*

The last quotation is indicating the current capacity of the post Saint-Jean, namely 133 MVA,

New information

Additional information regarding the power capabilities of the projected 315kV line has been provided by Hydro Quebec during the first round of public hearings and captured either in the transcripts of the sessions or in various documents produced by Hydro Quebec and loaded on BAPE site on the post Saint–Jean page.

In the evening session of April 2016 it was stated:

- “A 315kV line can transport more than one thousand (1,000) megawatts, but it is the substation that has two transformers to absorb the load” (page 176 of the transcript).
- “For the final phase (of Saint-John project) the ultimate average current will be 300A”.

  Author’s note: This should be understood per circuit, according to the document DA35 [RD-11] submitted to BAPE after the first round of public auditions. The total average current for the line will therefore be 600A.

In addition to the above:

- The document DA28 [RD-07] submitted by Hydro Quebec to BAPE after the first round of public hearings indicates the maximum transport capacity of the future 315kV aerial line (1920MVA) and also the maximum transport current (3500A).

Most of the above data, especially the 1920MVA/3500A transport capacity are maximum data for the projected 315kV line. It is understood that these values apply to the exploitation of the line in case of emergency. The actual power/capacity of the line is limited in exploitation by the capacity of the transformers. In the initial phase the capacity of the 315kV line will thus be 280MVA (for two transformers), while in the final phase it will be 560MVA (for four transformers). The final capacity will accommodate the capacity of the existing 120kV line (133MVA), whose charge will be entirely transferred to the new 315kV line in 5 years (final phase). It is estimated that the final exploitable power/capacity (in MVA) corresponds to a current of about 1000A. This is different from the average current anticipated by Hydro Quebec for the final phase, namely 600A, suggesting a 60% usage of the 315kV line capacity available for the station.

Analysis

The above data exhibit a certain degree of inconsistency/discrepancy with the data provided in the project submitted for approval to the Regie de l'Energy. They are incomprehensible without additional clarifications. The following observations can be made:

- According to Table B-1 in Annex B of Volume 2 of the Impact Study, the annual average current used for the calculation of the electromagnetic field (EMF) and for the noise generated by the two circuits of the new 315kV line (circuit 3046 and circuit 3047) is 147A per circuit. From the same table we learn that for the existing 120kV circuits the annual average currents (also used for EMF evaluation) are 241A and 141A for circuit 1253 and circuit 1254, respectively.

  Furthermore, the results for the future situation in Table B-1 do not mention the phase to which they apply. Certainly they do not apply to the final phase, for which an average current of 600A is anticipated.

  It is also noted that the magnetic field reported in DA35 has been calculated taking into consideration the 382A current through the existing 120kV line, the 600A current through the projected 315kV line, and also the 200A current through the distribution line. One would wonder why the distribution line, which contributes visibly to the magnetic field at the border of the servitude, has not been included in the impact study.

- There is a rather large discrepancy between the maximum transport capacity of the projected 315kV line (more than 1000MW, as stated by Hydro Quebec in afternoon session of 21 April 2016, probably up to 1920MVA, according to DA28) and the actual capacity projected for the Saint-John station (560MVA if the capacity is fully used, or 420MVA if one of the transformers has been considered for redundancy purposes). The obvious answer to this discrepancy is that the new 315kV line will be used not only as a supply line for the Saint-John station but also as a transport line for down-stream stations. In this regard Hydro Quebec did not deny that this option has been considered as part of their strategy for expending the 315kV network towards the west-end of the island of Montreal (e.g. to Bay d'Urfe station, see the transcript of April 21 2016 afternoon session), but insisted that it has not been planned. The author has no doubt that if the project were approved, the extension option (to Bay d'Urfe) would be certainly planned, and other extensions may follow given the maximum capacity of 1920kVA/3500A of the projected line. This is of great concern for DDO residents, who may find themselves exposed to substantially higher magnetic field levels and increased noise.

Conclusions

**The conditions for which the electromagnetic field and the noise power generated by the projected 315kV supply line have been evaluated are not representative for the exploitation conditions of the line, neither for the final phase of the project nor beyond the 5 years horizon of the final phase. The immediate implication is that the results of evaluations are also non-representative.**

**These results have been included in the Impact Study [RD-03][RD-04] submitted to the Regie de l'Energy for approval, misleading the Regie de l'Energy in the approval process for the Saint-Jean project.**

**Hydro Quebec lacked transparency in clearly presenting to DDO residents their intentions for the exploitation of the projected 315kV line, especially in long term. These intentions have only become known through the first round of public hearings.**

Despite the fact that the results of noise levels evaluation may not be fully representative for the exploitation conditions of the projected 315kV line, the new perspectives proposed in the following sections remain valid, since they refer to interpretation of the results in principle, not necessarily related to specific values.

## 4.2 Global vs. Tonal Noise Values and Noise Perception

In the methodologies used for noise evaluation, whether by measurement or simulation, the noise (acoustic) levels have been expressed as global values in dBA (covering the entire audible spectrum) for the purpose of assessing acoustic conformance to defined criteria, considered themselves as global values (also in dBA).

The global noise includes contribution from the ambient noise and from the power line and/or station (electrical noise). If the electrical noise were equal to the ambient noise, the global noise would be 3dB higher than either of them, equivalent to the doubling of the ambient noise as a result of the line and/or station operation.

The higher the ambient noise, the lesser the impact from the electrical noise will be on the total (global) noise. Conversely, the lower the ambient noise, the more important the impact from the electrical noise will be.

The ambient noise and the electrical noise have, in general, different spectral composition and therefore will be differently affected by the A-weighting filtering. This may result in easily audible tones from the electrical noise (especially at high frequencies, where the noise is very penetrating/disturbing), even when the global electrical noise seems negligible.

The relationship between the global and tonal noise can be better illustrated by resorting to some concrete cases, as described in the following subsections.

### 4.2.1 The Noise Generated by the 315 kV Line

Initial information / Hydro Quebec position

According to section 9.6.2 in Volume 1 of the environmental report [RD-04] submitted by Hydro-Quebec for the Saint-Jean project,

*Pendant l'exploitation de la ligne projetée,* ***le bruit émis pourrait être audible lorsque les conducteurs sont mouillés****, alors qu'actuellement le bruit émis par la ligne existante à 120 kV n'est pas audible. Toutefois, ce bruit demeurera inférieur au bruit ambiant du secteur résidentiel traversé.* ***L'impact sur le climat sonore pendant l'exploitation de la ligne est jugé***

***d'importance moyenne compte tenu de son intensité faible, de son étendue locale et de sa longue durée.***

The report also states that the circumstances in which the noise will be audible are present during 20% of the time.

Additional information

During Hydro-Quebec's information session, DDO residents asked whether it was possible for Hydro Quebec to provide a breakdown of the total evaluated noise into its ambient and line-generated components, and to show spectral properties of each component. The graph in Figure 4-1 has been provided in response, as part of document DA3 [RD-02]. The spectral components are represented as bands for thirds of octave. The ambient noise was measured along De Salaberry corridor between Des Sources station and Saint-Jean station, during the night of 12-13 August 2014, under fable rain. The residual ambient noise (without the noise from the line) was coming mainly from the highway 40 and from the song of crickets, rather strong at that time of the year. The noise from the line corresponds to wet conditions for the conductors.

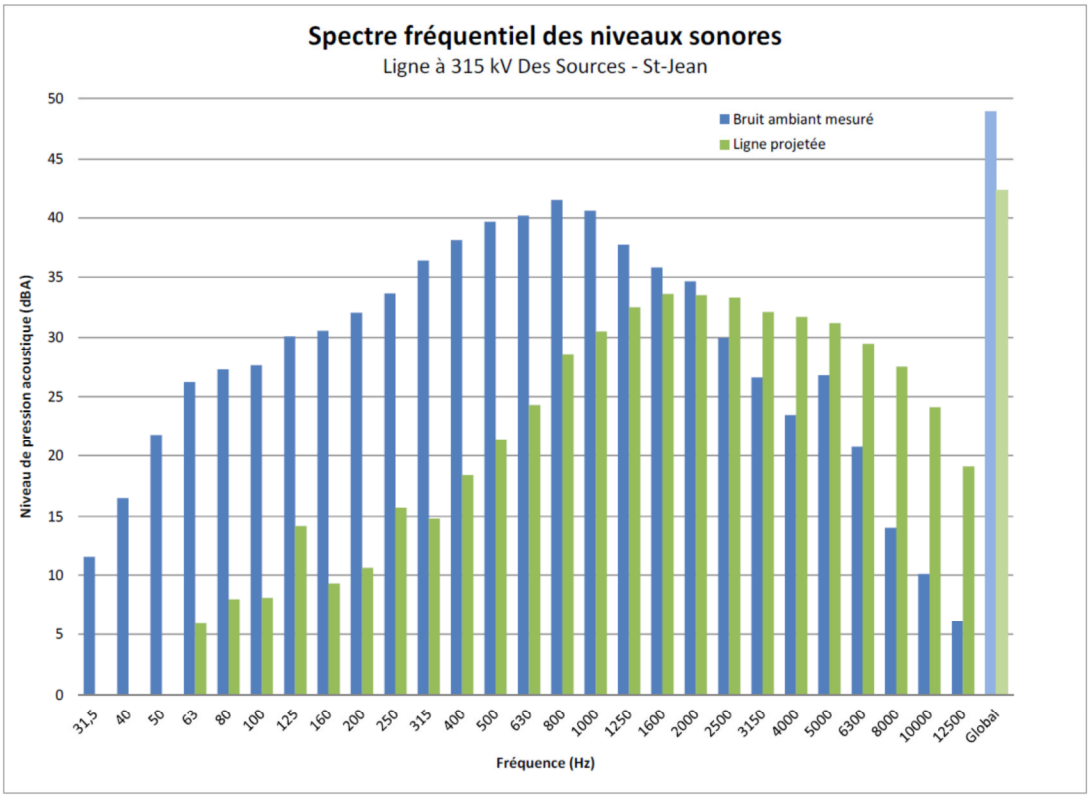


**FIGURE 4-1. SPECTRAL COMPONENTS OF THE NOISE LEVELS**

Analysis:

The graph indicates why in the environmental report Hydro-Quebec admits that the noise will be audible when the conductors are wet, even if the global noise from the line is about 5dBA lower than the global ambient noise. The spectrum of the line noise is concentrated at higher frequency compared to the spectrum of the ambient noise. For the higher frequencies (8000 Hz-12500Hz), the differences in amplitude between the spectral components of the line noise and ambient noise are approximately 12dBA, which is not negligible. Had the measurement of the ambient noise been performed at another time, without the contribution from the insects' song

(e.g. in June), the difference would have been higher, and so would have been the impact (perception) of the line noise.

For having lived next to high-power lines for over 10 years, the DDO resident Talar Chahinian can attest to the disruptive nature of the buzzing from a high-voltage power line. She claims to have often had to close her windows, with hopes for a respite, and most often the noise still seeped into the house was strong enough to perturb her sleep.

The above analysis demonstrates why the global values do not tell the whole story, and conformance of the noise level produced by the high-voltage power line to the specified criteria is not enough to prevent subjecting the residents living close to power lines to such inconveniences and disruptions.

Conclusion

**Given the deterioration of the quality of life of the citizens living near the servitude of the projected 315kV line, we request, as concerned citizen, that alternative options be seriously considered by Hydro Quebec, such as underground lines.**

### 4.2.2 The Noise Produced by the Saint-Jean Station

Available information

Before this project entered the phase of public consultation, the "Direction des politiques de la qualité de l'atmosphère" requested (as per l'Expertise technique in [RD-08]) that a corrective value of 5dB be added to the evaluation and attenuation measures of noise at the power station due to the tonal characteristic of this noise, stating:

*Malgré le fait que le critère pour définir un bruit à caractère tonal ne ressort pas lors de l'analyse en tiers d'octave, nous considérons, par mesure de précaution, qu'un terme correctif de 5 dB devrait être appliqué.*

Hydro-Quebec acknowledged this request, and decided to go ahead without implementing the 5dB corrective value stating in their response to QC20 from the "Direction de l'evaluation environnementale des projets terrestres" of MDDELCC [RD-09]:

*Pour que l'ambiance sonore soit jugée « à caractère tonal », la contribution du bruit particulier doit être suffisamment importante pour faire « émerger » une bande de fréquence du bruit ambiant. Dans un secteur urbanisé comme celui où se trouve le poste Saint-Jean, le bruit résiduel est élevé (minimum de 46 dBA la nuit). Ce bruit résiduel élevé limite l'émergence des tons purs émis par les équipements du poste et masque en quelque sorte le bruit du poste.*

*De plus, les mesures d'atténuation particulière P14 à P16 décrites dans l'étude d'impact sur l'environnement (section 9.4.2.1, p. 9-17), permettent de limiter le niveau de bruit anticipé à la limite des résidences riveraines du poste à 40 à 42 dBA (points d'évaluation B, C, D et E du tableau 6-1, p. E-29), soit 4 à 6 dBA en dessous du seuil établi pour ces zones sensibles (46 dBA). Ces 4 à 6 dBA constituent une «marge de sécurité» qui nous semble adéquate dans le contexte du projet.*

Analysis:

There needs to be a clear distinction made between "acceptable" levels of noise (used as evaluation criteria to demonstrate acoustic conformance), and "desirable" levels of noise. It is not because there are means implemented to reduce the noise to "acceptable" levels, that residents will not see deterioration to their quality of life. As argued in section 4.2, the impact from noise on residents depends not only on the global noise level, which can be considered acceptable as long as noise criteria are met, but also on the tonal nature of the noise.

Furthermore, the request/directive from MDDELCC was to add a 5 dB corrective factor to the acoustic noise evaluation formula Hydro Quebec has used for the acoustic noise analysis presented in the Impact Report, to ensure that the quality of life of the residents adjacent to the substation is preserved. This request is consistent with 2006 version of MDDELCC 98-01 directive.

Hydro-Quebec has summarily dismissed this directive, arguing that the ambient noise was so high that it prevented the emergence of tonal noise bands, with the self-serving position that it has "already done enough" to attenuate the noise. They omitted to mention that in their evaluation of the noise levels, especially for the closest residential area with regard to the station, the main contributor to the ambient/residual noise was from the song of insects (see table 2-2 in Annex E of the Impact study, volume 2). The song of insects (especially crickets) is well known to all residents bordering the De Salaberry corridor. It starts at the end of July and continues through the fall months. And curious enough, even if it is very strong, the noise is not disturbing since it is part of a natural environment to which the humans are used.

Conclusion

**The arguments invoked by Hydro Quebec to dismiss the MDDELCC directive regarding the impact from the tonal noise generated by the Saint-John station are not valid, since the measured ambient noise is not representative for most part of the year.**

**As concerned residents, we request that Hydro-Quebec upholds the directive and apply a 5dBA corrective term to the evaluation noise level, to ensure that DDO residents do not see a reduction in their quality of life due to the refurbishing/expansion of Saint-John station.**

## 4.3 Measured and Simulated Noise Values

Available information

During Hydro-Quebec's information session, DDO residents asked whether it was possible for Hydro Quebec to provide a breakdown of the total evaluated noise into its ambient and line-generated components, and to show spectral properties of each component. The graph in Figure 4-1 has been provided in response, as part of the document DA3 [RD-02] (for other relevant comments see section 4.2.1). It represents the spectral components of the simulated noise of the line (in green) at the limits of Hydro Quebec servitude along the De Salaberry corridor. The graph also includes the spectral components of the ambient noise.

After the information session Hydro Quebec has submitted the document DA36 [RD-10], with results of ambient noise measurements for a high-voltage line already in exploitation. The noise was measured under the existing 315kV line east of Des Sources station, in rain conditions (wet conductors) and also in dry conditions. For both conditions the results are presented in Figure 4-3.

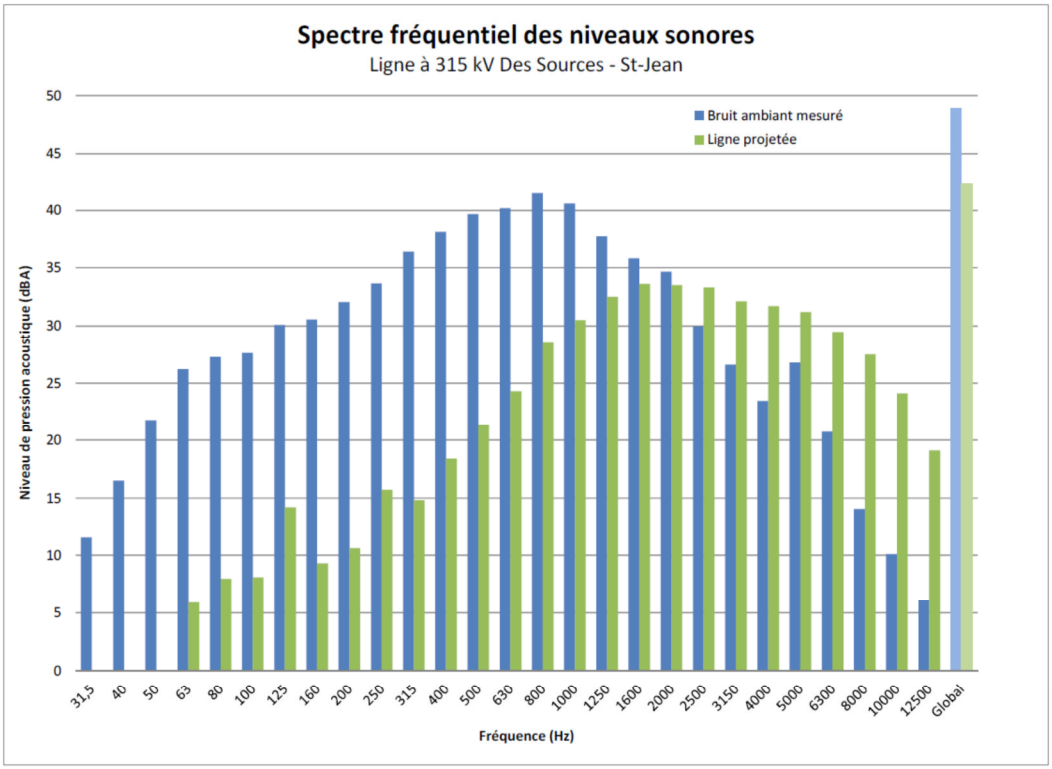


**FIGURE 4-2. SPECTRAL COMPONENTS OF THE ESTIMATED NOISE UNDER A 315KV LINE**

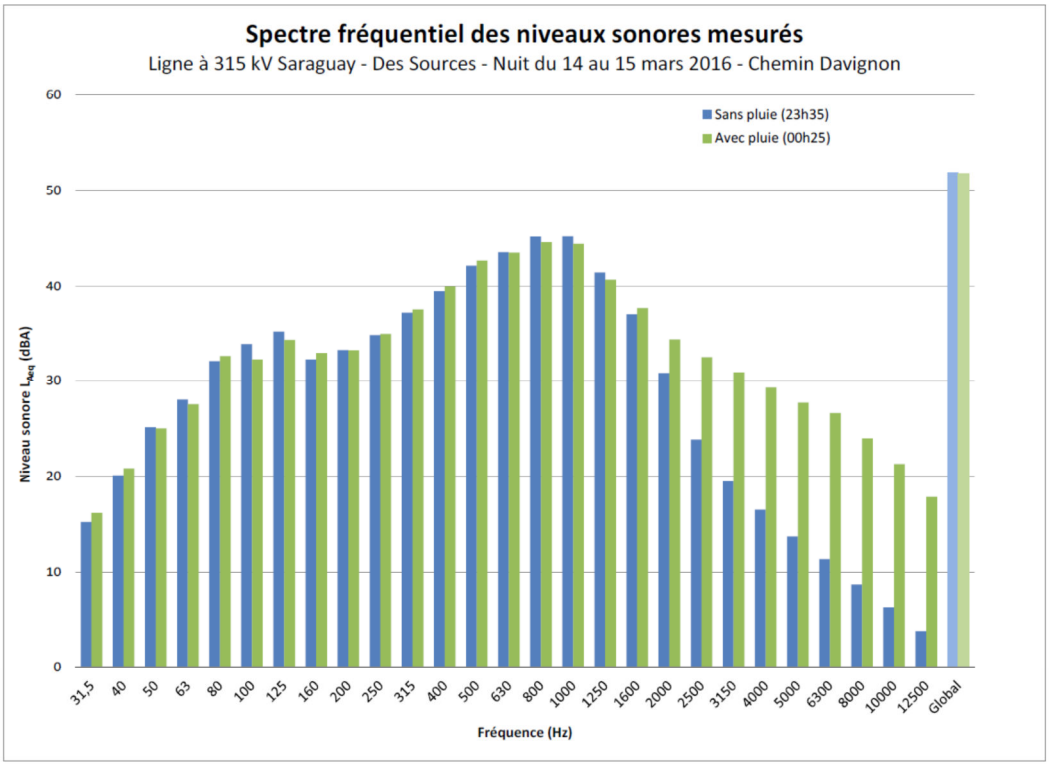


**FIGURE 4-3. SPECTRAL COMPONENTS OF THE AMBIENT NOISE MEASURED UNDER A 315KV LINE**

Analysis

In Figure 4-3 the two sets of tone bands almost overlap for the most part of the spectrum, indicating that the noise from the line in wet conditions is rather small (close to negligible) when compared to the noise in dry conditions, considered representative for the ambient noise. By contrast, the noise from the line in wet conditions increases significantly at high frequencies (above 2000Hz). The global values for both conditions are almost the same, indicating that the overall noise from the line (in wet conditions) is very small, rather negligible, compared to the ambient noise. Despite this, the line noise was audible, as reported by the operator. This is one more argument in support of the analysis performed in section 4.2.1.

One could subtract (logarithmically) the ambient noise measured in dry conditions from the ambient noise measured in wet condition. The result could be considered representative for the measured noise of a 315kV line in exploitation. By comparing it with the simulated noise in Figure 4-2, one can cross-validate the results of noise assessment by measurement and simulation, thus validating the simulation model as well. The cross-validation should be observed primarily with regard to the shapes of the measured and simulated noise spectra, noting that the absolute values of the spectral components may differ, due to different distance from the line to the points where the noise was evaluated (under the line for measurements, at the servitude limit for simulation).

Conclusion

**Performing the analysis suggested above would increase the confidence in the simulation model and simulation results.**

### 4.4 Municipal Bylaws on Noise

Presented information:

Hydro-Quebec states that they are in-line with the municipal bylaw DDO-R-2014-094 concerning nuisances produced by noise. In the absence of specific quantitative criteria in the bylaw for the noise produced by power stations (and the equipment within) and power lines, Hydro Quebec retained a level of 50dBA as municipal requirement for the noise at the limit of residential properties in sensible zones.

DDO residents position

**It is requested that Hydro-Quebec clarified with the City of Dollard-Des-Ormeaux the levels of acceptable noise generated by power stations and lines, instead of extrapolating by themselves the information in the municipal bylaw.**

## 5. SUMMARY AND CONCLUSIONS

The brief (memoire) starts with a short introduction, defining its objectives. The main elements associated with noise level evaluation are introduced next, in order to create a context for the memoire. They consist of a description of the characteristics of the noise generated by the power station and by the 315kV line, followed by a summary of promoter's methodologies for noise evaluation for the power station and for the high-voltage line; the latter is complemented by a brief discussion on the role of A-weighting filtering in noise evaluation.

The main part of the memoire is proposing new perspectives into the interpretation of promoter's noise evaluation results, preceded by a summary of the premises used for noise evaluation. More specifically, the memoire addresses the following aspects:

- Electrical power considerations

- Global vs. tonal noise values and noise perception
- Measured and simulated noise values
- Municipal Bylaws on Noise

The main conclusions reached after the analysis of each of the above aspects are summarised below:

- **The conditions for which the electromagnetic field and the noise power generated by the projected 315kV supply line have been evaluated are not representative for the exploitation conditions of the line for the final phase of the project and beyond. The immediate implication is that the results of evaluation are also non-representative. These results have been included in the Impact Study submitted to the Regie de l'Energy for approval.**
- **The arguments invoked by Hydro Quebec to dismiss the MDDELCC directive regarding the impact from the tonal noise generated by the Saint-John station are not valid, since the measured ambient noise is not representative for most part of the year. As concerned residents, we request that Hydro-Quebec upholds the directive by adding a 5dBA corrective term to their noise study and implement attenuation methods to reach this improved requirement, to ensure that DDO residents do not see a reduction in their quality of life due to the refurbishing/expansion of Saint-John station.**
- **Alternative options to the aerial 315kV line must be seriously re-examined (such as underground lines) in order to prevent the deterioration of the quality of life of the residents due to the noise that the aerial lines will be generating.**
- **Hydro-Quebec must discuss with the City of DDO the issues concerning the noise bylaws, instead of extrapolating the bylaws to assign themselves noise level targets.**

## 6. REFERENCES

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