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File No. 104873-01

Yukon Energy
#2 Miles Canyon Road
Box 5920, Whitehorse, YT Y1A 6S7

Attention: Travis Ritchie, Manager – Environment, Assessment, & Licensing

Re: Yukon Energy, Whitehorse Rapids Generating Station – Noise Monitoring Assessment

1.0 INTRODUCTION

Hemmera Envirochem Inc. (Hemmera) was retained by Yukon Energy Corporation (YEC) to conduct a noise monitoring assessment of the Whitehorse Rapids Generating Station. Noise monitoring was requested to assess noise levels in the Riverdale subdivision when the four main diesel generators were in operation between April 22 and April 25, 2020 and when the generators were shut down between May 2 and May 5, 2020 to establish baseline noise levels.

Low water levels this spring in the Yukon were the result of drought conditions and low snow pack levels. Consequently, with less water available to generate electricity and with the loss (out-of-service) of one natural gas generator, diesel generators were needed to compensate for this loss to meet power supply requirements.

2.0 REGULATORY NOISE GUIDANCE

In the absence of any specific regulatory noise guidance or criteria in the Yukon for the generating station, noise guidance in British Columbia Oil and Gas Commission's (BC OGC) *British Columbia Noise Control Best Practices Guideline* and Health Canada's (HC) *Guidance for Evaluating Human Health Impacts in Environmental Assessments: Noise, 2017* will be referred to in this assessment.

BC OGC guidelines are widely accepted in western Canada and commonly used in the Yukon. The guidelines strike a balance between the need to accommodate development and the need to control noise emissions from energy-industry activities. The guidance is receptor-based and defines a fixed limit on the amount of noise measured at receptor locations potentially impacted by noise generated by energy-related facilities. A permissible noise level (PSL) at the nearest residence and nearby receptors can be determined based on the guideline methods. Daytime noise levels (Ld) from 7:00 to 22:00 and nighttime

noise levels (Ln) from 22:00 to 7:00 are the main noise parameters used to calculate the PSL. The Ld parameter is primarily used in this assessment for comparison to BC OGC criteria since the generators only operate in the daytime.

Health Canada provides indicators to determine potential health risks, the approach for a noise assessment, and methods to reduce or mitigate potential impacts. This assessment refers to the HC indicator of percent highly annoyed (%HA) and a change in %HA greater than 6.5% represents the value in which mitigation measures should be considered. A day-night noise level (Ldn) which combines the day and night noise level measurements to a 24-hour sound level is used to calculate the %HA.

3.0 NOISE ASSESSMENT METHODS AND MONITORING RESULTS

3.1 Noise Monitor Locations

The nearest residences to the generating station are on the east side of Nisutlin Drive, across the road from the Nisutlin Drive electrical substation. Noise monitoring at the substation (NM1) as indicated in **Figure 1** was conducted to assess noise levels that are deemed to be representative of conditions at the nearest residences on Bell Crescent backing onto Nisutlin Drive. Noise monitoring was also conducted in the yard of a residence on Bell Crescent (NM2) and near the fenceline of the Whitehorse Rapids Generating Station (NM3).

Figure 1 Noise Monitor Locations

3.2 Baseline and Operation (with generators) Noise Monitoring

To establish baseline and operation noise levels 24-hour measurements were taken with a Larson Davis Model 831 Type 1 noise monitor. Baseline noise monitoring was conducted at NM1 and NM3. Operation noise monitoring that included all four YEC owned generators operating was conducted at all three locations.

3.2.1 Baseline Monitoring

The baseline monitoring measurements, when YEC owned generators were not in operation, for NM1 and NM3 are provided in **Table 1**.

Table 1 Baseline (24 hr) Noise Monitoring Data – Diesel Generators Off

Noise Location	Date	Ldn (24 hr)	Ld (7:00 to 22:00)	Ln (22:00 to 7:00)
NM1 – Substation	May 5, 2020	56.7	53.6	49.4
NM3 – Fenceline	May 2, 2018	75.0	67.2	68.8

3.2.2 Operation Monitoring

The operation monitoring measurements, when the YEC generators were running, at NM1, NM2 and NM3 are provided in **Table 2**.

Table 2 Operation (24 hr) Noise Monitoring Data

Noise Location	Date	Ldn (24 hr)	Ld (7:00 to 22:00)	Ln (22:00 to 7:00)
NM1 - Substation	April 22, 2020	66.5	66.4	56.6
NM2 - Bell Crescent	April 23, 2020	51.5	52.5	38.7
NM3 - Fenceline	April 25, 2020	75.6	74.1	67.3

3.2.3 Monitoring Results

During the period of operation monitoring the generating station was running with between one and four generators from approximately 7:00 to 23:00 which closely aligns to the assessment daytime period (Ld) of 7:00 to 22:00. The focus of the assessment is a comparison of the daytime baseline noise levels with the operation daytime levels. As noted from the baseline and operation monitoring results, the main distinction of daytime noise levels is seen at NM1. There is about a 12 to 13 dBA increase in the daytime measurement at the substation when the generators are in operation as compared to the baseline. The increase at the fenceline (NM3) is about 7 dBA and is a lower noise level increase due to higher ambient baseline levels near the rapids.

4.0 NOISE GUIDANCE COMPARISONS

In this section, the noise monitoring measurements are compared to BC OGC and Health Canada guidance and the comparison values are provided in **Table 3** and **Table 4**, respectively.

The BC OGC guidance establishes a noise limit at receptors based on dwelling density and proximity to roadways. The noise limit for a receptor is referred to as the Permissible Sound Level (PSL). The daytime PSL or Ld noise level is determined based on the time from 07:00 to 22:00 hrs. The daytime PSLs for the nearest residence backing onto Nisutlin Drive (NM1) and on Bell Crescent (NM2) are determined using the procedures outlined in the guidance. The location surrounding the residences have a dwelling unit density of greater than 160 dwellings per quarter section (dwellings within a 451 m radius) and are in Category 2 described as within more than 30 m and less than 500 m of a heavily travelled road. From these criteria the daytime PSL for these locations is 61 dBA.

As illustrated in **Table 3**, the daytime noise level at the residence on Bell Crescent (NM1) is well under BC OGC criteria and is exceeded at the electrical substation (NM2) by approximately 5.4 dBA. The fenceline measurement (NM1) is provided for reference purposes only to establish the sound pressure levels near the generating station.

Table 3 Comparisons to BC OGC Noise Guidance Criteria

Noise Location	Noise Measurement and Criteria	
	Ld	BC OGC Ld
NM1 - Substation	**66.4**	**61.0**
NM2 - Bell Crescent	52.5	61.0
NM3 - Fenceline	74.1	NA

Health Canada guidance is based on the change in baseline and operation noise percentage highly annoyed (Δ%HA). Baseline noise values (Ldn, 24 hr) are provided for community types including normal suburban residential (not located near industrial activity) at 55 dBA and urban residential (not immediately adjacent to heavily travelled roads or industry) at 60 dBA. The community types for NM1 and NM2 are characterized as urban residential and thus the baseline is 60 dBA. HC recommends baseline measurements for receptors that may have potential noise impacts and therefore NM1 baseline measurements were assessed as well as the community type baseline in this assessment.

The comparison to Health Canada noise guidance for each of the receptors is provided in **Table 3**. The Bell Crescent (NM2) receptor is well under HC guidance. The Fenceline (NM3) provides reference values and is not considered a receptor of concern although it meets HC guidance. The substation (NM1) which is representative of the nearest residences exceeds the recommended operation criteria by 2.3 %HA for the general HC guidance and by 4.9 %HA as compared to the measured baseline value.

Table 4 Comparisons to Health Canada Noise Guidance Criteria

Noise Location	Operation and Baseline Noise Levels		HC Noise Guidance Criteria	
	Operation Ldn	HC Baseline Ldn[1]	Δ%HA	HC Δ%HA
NM1 - Substation	66.5	60.0 (56.7)	**8.8 (11.4)**[2]	**6.5**
NM2 - Bell Crescent	51.5	60.0	-1.5	6.5
NM3 - Fenceline	75.6	(75.0)	1.9	6.5

Note 1: General HC guidance and baseline measurement in brackets

2: Potential exceedance in bold

5.0 CONCLUSIONS AND RECOMMENDATIONS

Comparisons to the guidance criteria indicate that receptors NM2 and NM3 are below guidance noise criteria and NM1 is above the noise criteria as recommended by the BC OGC and HC. NM1 is approximately 5.5 dBA above the BC OGC noise level and 2.3 % above the HC Δ%HA criteria. The exceedances of the noise criteria are explained by the increase in baseline daytime noise of 12.8 dBA at the substation when the generators are operating. It is understood that the four diesel generators may not be required in the future; however, a reduction in approximately 5 to 6 dBA would attenuate the noise from the generators to meet guidance criteria. Installing noise attenuating louvers on the existing vents may be sufficient to mitigate the noise to below criteria levels.

We have appreciated the opportunity of working with you on this project and trust that this report is satisfactory to your requirements. Please feel free to contact the undersigned regarding any questions or further information that you may require.

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6.0 REFERENCES

British Columbia Oil and Gas Commission (BC OGC). 2009. British Columbia Noise Control Best Practices Guideline.

Health Canada. 2017. Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise