

# NCIA Regional Noise Management Plan (RNMP) Report

# (covering the 2021 Calendar Year)

Prepared for the

Albert Energy Regulator (AER)

And

# The Alberta Utilities Commission (AUC)

November 7, 2022

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#### NCIA Regional Noise Management Plan (RNMP)

Annual Report to the Alberta Energy Regulator (AER) and

The Alberta Utilities Commission (AUC)

2022 (covering the calendar year 2021)

#### 1 Executive Summary

Field validation measurements for the Regional Noise Model (RNM) were completed in 2021 (conducted by ACI Acoustical Consultants Inc.). The 2021 field validation measurements are compared to the range of sound levels that can be expected (from the 2018 RNM version 2) due to varying weather conditions at each location. Monitoring location details are presented in Table 1 and Figure 1 below.

In general, the model predictions are either in line with the measured sound levels, or overpredicting. This over prediction can be expected due to the sound propagation model assuming that all facilities are running with all sources simultaneously. The highest overpredictions are at Location 2, 4D (2021 2nd Night), 8A, 10 and 11B. Most are in or around 3 dB from the predicted RNM range. Location 11B has the greatest difference between RNM and measured sound levels (approximately 6 dB from the lowest end of the RNM range), which could be due to the theoretical sound emission characteristics for portions of the Pembina RFS facility.

The under-predictions are occurring at locations 6 and 13. The predicted sound level at Location 6 for one night was below the measured value, which has generally been the case. The ACI report indicates the higher measured sound level at Location 6 is reflective of the acoustic environment when the sound contributions from the facility to the west (Nutrien Redwater) are dominant. More alignment in RNM and measured sound levels for Location 6 could occur after the inclusion of the updated Nutrien Redwater sound sources in 2023. The predicted sound level at Location 13 was below that measured, which is likely due to the absence of the Sturgeon Refinery in the existing model case (this will be corrected in the 2023 RNM update. Measured versus modeled results for the 2021 field data are shown in Table 2 and Figure 2 and 3. A discussion of the results is presented in Section 3 of this report.

Figure 4 shows trend analysis that was completed for any location that had at least 4 years or more of data. Due to Location 4 moving further north in 2021 to a location similar to the measurement location used from 2012 to 2014, the comparison for Location 4 uses the data from 2012 to 2014 and 2021. The results provide similar information to what has been seen previously. Some locations are trending upward, others downward and some are consistent. When comparing them, there is no conclusive upward or downward trend of sound levels across the region in general. There are just local variances throughout the years.



#### 2 AER Audits of NCIA Member Facilities

No Audits of NCIA member companies' Regional Noise Management Plans were conducted by AER in 2021.

#### 3 2021 Monitoring results for Regional Noise Model (Appendix 1)

ACI Acoustical Consultants Inc., of Edmonton AB, was retained by the Northeast Capital Industrial Association (NCIA) to conduct an environmental noise survey within Alberta's Industrial Heartland (AIH). The purpose of the study was to conduct a single 48-hour noise monitoring at eleven (11) pre specified locations within the AIH. An additional noise monitoring, spanning two (2) 48-hour periods, was conducted at a 12th monitoring location (referred to as Location 12) as an independent control/reference point. The noise monitoring was conducted in support of the NCIA's Regional Noise Management Plan. In addition, the results from these noise monitoring's will be used to validate the Regional Noise Level Assessment Model (the Regional Noise Model). All noise monitoring procedures and equipment used was in accordance with the requirements of the Alberta Energy Regulator (AER) Directive 038 on Noise Control. Site work was conducted for ACI in July 2021 by P. Froment, B.Sc., P.L.(Eng.).

As part of the study, a total of thirteen (13) 48-hour noise monitoring's were conducted throughout the Alberta's Industrial Heartland. In many cases, the weather conditions during the 48-hour time monitoring periods resulted in noise levels representing the typical noise climate of each noise monitoring location. As such, the isolated noise levels and 1/3 octave band Leq sound levels were consistent between night-time periods and when compared to previous years.

The noise levels at most locations consisted of low frequency components with occasional mid/high frequency components that could be attributed to the nearest facility relative to each individual noise monitoring location. Despite the noise being relatively low in frequency, none of the sites indicated any low frequency tonal components. The results from 2021 indicated that the isolated LeqNight noise levels in many of the noise monitoring locations have stabilized. Lastly, based on the results from recent years it is apparent that rail activity is now a major noise source within the entire Heartland region.

The noise monitoring locations were the same for 2021 as in previous years for all monitoring locations except 4 which moved further north, closer to its previous location from 2012 to 2014. Locations are shown in Table 1 and Figure 1 below. Complete details can be found in Appendix 1 of this report.

Measured versus modeled results are shown in Table 2 and Figures 2 and 3 below. Figure 4 below presents a multi-year trend analysis.

The results in Table 2 indicate some fairly large differences between measured and predicted sound levels at several locations. In previous assessments, it was noted that the field measured results often varied quite significantly between the two nighttime periods which made it difficult to draw conclusions on the data. Therefore, it was suggested that instead of comparing measured sound levels to predicted sound levels for a specific meteorological condition, it would be more



meaningful to compare the measured levels to predicted levels based on a range of possible meteorological conditions.

The meteorological conditions used to define the extents of the predicted range are representative of temperature lapse conditions (calm wind with Pasquill Stability Class "b"), and temperature inversion conditions (calm wind with Pasquill Stability Class "F"). These represent the reasonable extremes of meteorological conditions that may exist at any given time in the region. The Case 3 model was run with these parameters to define the lower and upper limits of predicted sound levels at each monitoring location, and the measured sound levels are compared to these ranges, as shown in Figures 2.

Monitoring	UTM Co (Appro	ordinates oximate)	Start Time	End Time	
Location	Easting (m)	Northing (M)			
1D	355210	5954157	7/29/21 9:00	7/31/21 9:00	
2	358256	5957216	7/06/21 12:00	7/08/21 12:00	
3B	358361	5959283	7/06/21 12:00	7/08/21 12:00	
4D	361694	5961309	7/29/21 7:30	7/31/21 7:30	
5	361777	5964711	7/06/21 12:00	7/08/21 12:00	
6	364322	5967894	7/29/21 8:00	7/31/21 8:00	
8A	358897	5965430	7/06/21 12:00	7/08/21 12:00	
9	355872	5957574	7/06/21 12:00	7/08/21 12:00	
10	355925	5955818	7/06/21 11:30	7/08/21 11:30	
11B	358332	5963775	7/06/21 12:00	7/08/21 12:00	
12B (1st 48-hour)	260222	5062070	7/06/21 12:00	7/08/21 12:00	
12B (2 <sup>nd</sup> 48-hour)	300223	5903070	7/29/21 8:30	7/31/21 8:30	
13	358667	5970180	7/06/21 12:00	7/08/21 12:00	

#### Table 1 Monitoring Location Details

The complete report is included as Appendix 1 of this report.





Figure 1: NCIA Regional Noise Monitoring Locations (as per Table 1)

Comparison of Measured versus Modelled (predicted) results for 2021

	1st	t Nighttime Pe	eriod	2nd	d Nighttime P	eriod	A
Location			delta			delta	Average
Location	Measured	Predicted	(Predicted - Measured)	Measured	Predicted	(Predicted - Measured)	(dBA)
1D	51.9	52.8	0.9	51.0	54.9	3.9	2.4
2	47.3	53.1	5.8	48.9	53.4	4.5	5.2
3B	45.1	49.0	3.9	47.1	47.5	0.4	2.2
4D	50.9	45.9	-5.0	43.6	50.1	6.5	0.8
5	52.7	57.7	5.0	53.2	56.5	3.3	4.2
6	47.4	39.8	-7.6	44.5	40.1	-4.4	-6.0
8A	46.5	55.3	8.8	46.2	55.3	9.1	9.0
9	44.3	49.2	4.9	45.4	48.8	3.4	4.2
10	50.0	57.3	7.3	51.1	56.5	5.4	6.4
11B	38.7	48.4	9.7	38.7	49.8	11.1	10.4
12B (1st 48 hour)	36.4	25.0	-11.4	35.2	23.4	-11.8	-11.6
12B (2nd 48 hour)	32.0	23.8	-8.2	30.6	24.6	-6.0	-7.1
13	39.3	34.0	-5.3	38.0	33.2	-4.8	-5.1



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Some general comments to consider while reviewing the results:

- The Pembina facility includes some theoretical sound emission characteristics. In-plant sound level measurements are planned at this facility for 2022. The accuracy in the predicted sound levels in the vicinity of that facility will increase once the sources in the RNM are updated after the measurements.
- An in-plant sound survey was undertaken at the Nutrien Redwater facility in 2022 to update some of the sources in the model. The predicted sound levels from this facility will have increased accuracy after this update is included in the next iteration of the RNM.
- The Sturgeon Refinery model has not been added to the RNM's validation case. Once included (based upon site measurements to be taken in 2022), predicted sound levels should more closely reflect measured sound levels in the vicinity of the facility.
- The new InterPipeline Heartland facility is not included in the RNM. Once included (and ideally based on site measurements to be taken in the future), predicted sound levels in the vicinity should more closely reflect measurements.

The highest overpredictions are at Location 2, 4D (2021 2nd Night), 8A, 10 and 11B. Most are in or around 3 dB from the predicted RNM range. Location 11B has the greatest difference between RNM and measured sound levels (approximately 6 dB from the lowest end of the RNM range), which could be due to the theoretical sound emission characteristics for portions of the Pembina RFS facility.



The under-predictions are occurring at locations 6 and 13. The predicted sound level at Location 6 for one night was below the measured value, which has generally been the case. The ACI report indicates the higher measured sound level at Location 6 is reflective of the acoustic environment when the sound contributions from the facility to the west (Nutrien Redwater) are dominant.

There were a significant number of facility turnarounds this year as well, and while every effort is made to ensure that facilities are operating near normal during the field measurements, that may not always be the case.



#### Figure 3: Comparison of 2021 Field Measurements to Model Predictions

The predicted sound levels are based on the sound propagation characteristics for actual averaged weather conditions recorded in the ACI Report. An overarching observation is that there is variance between the measured and predicted sound levels. The ACI report indicates the large sound level difference between the two nighttime periods at Location 4 may be due to a change in facility operation.



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#### Figure 4: Trend Analysis of Measured Data (2012 to 2021)

Due to Location 4 moving further north in 2021 to a location similar to the measurement location used from 2012 to 2014, the comparison for Location 4 uses the data from 2012 to 2014 and 2021. The results provide similar information to what has been seen previously. Some locations are trending upward, others downward and some are consistent. When comparing them, there is no conclusive upward or downward trend of sound levels across the region in general. There are just local variances throughout the years.

#### 4 NCIA Member Compliance

Table 3 summarizes the compliance requirements for NCIA member and non-member companies' vis-a-vis the NCIA RNMP.

NCIA Member	AER Regulated	RNMP Participant	Compliance Vehicle
Yes	Yes	Yes	NCIA - RNMP
No	Yes	No	AER to Determine
Yes	No	No	Municipality/AEP
Yes	No	Yes	NCIA - RNMP
No	No	Yes	Potential NCIA-RNMP
No	No	No	Other Regulatory
			Jurisdictions

 Table 3

 Compliance Requirements for NCIA Member Companies



As of this date, Table 4 summarizes the NCIA member companies and their status with respect to Table 3 above. Complete details can be found in Appendix 2.

NCIA Member <sup>1</sup>	AER Regulated Status for Noise Control Directive 038	Filed an Annual Update with NCIA for 2021 (Appendix 2)	Developed a Site Noise Management Plan
Air Liquide Canada	Not regulated	Yes	Yes
Aux Sable Canada	Regulated under Section 11	Yes	Yes
	of the OSCA and therefore		
	D-038.		
Conifer Energy	AER regulated under Noise	Yes	In Draft form
	Control Directive 038.		under review
Bunge Canada	Not Regulated	Yes	No
Cenovus Energy	Not regulated	Yes	Yes
Chemtrade West	Not regulated	Yes	Yes
Dow Chemical Canada	Regulated under D-038	Yes	Yes
	Operator No. 0F05		
Enbridge Pipelines	Is regulated	Yes	Yes
Evonik	Not regulated	Yes	Yes
Inter Pipeline HPC	Not Regulated	Yes	Yes
Keyera Corp.	Regulated under D-038	Yes	Yes
	Operator No. A5W1		
	LSD - 02-14-055-22W4		
	Facility No. F-12695		
Linde Canada	Not regulated	Yes	Partly
MEG Energy	Has no noise generating	Covered by Wolf	Covered by Wolf
	assets in the region now	Midstream	Midstream
MEGlobal	Not regulated	Included with	Yes
		Dow's submission	
North West Redwater	Is regulated.	Yes	Yes
Partnership	LSD - E1/2-18-56-21-W4M		
Nutrien Fort	Not regulated	Yes	Yes
Saskatchewan	_		
Nutrien Redwater	Not regulated	Yes	Yes
Oerlikon Metco	Not regulated	Yes	Yes
(Canada)			

# Table 4 Summary of NCIA Member Company Information for RNMP



NCIA Member <sup>1</sup>	AER Regulated Status for Noise Control Directive 038	Filed an Annual Update with NCIA for 2020 (Appendix 2)	Developed a Site Noise Management Plan
Pembina NGL	Regulated under D-038	Yes	Yes
Corporation			
Plains Midstream	Regulated under D-038	Yes	Yes
Canada	Operator No. 60		
	LSD - 14-55-22 W4M		
	Facility No. 12699		
Linde Canada	Not regulated	Yes	Partly
Shell Chemicals	Not regulated	Yes	Yes
Shell Refinery	Regulated under Section 11	Yes	Yes
	of the OSCA and therefore		
	Noise Control Directive 038.		
	AER Approval No. 11640.		
Shell Upgrader	AER Approval No. 8522	Yes	Yes
	regulated under D-038.		
Sherritt International	Not regulated	Yes	Yes
Umicore Canada	Not regulated	Yes	Yes
Wolf Midstream	AER regulated under Noise	Yes	Yes
	Control Directive 038.		

<sup>1</sup>**Bold** type in the above table signifies that these members have operational assets on the ground within Alberta's Industrial Heartland.



### 5 Regional Noise Model General

#### 5.1 Improvements/Corrective Actions implemented in 2021/22 (Appendix 2)

- 1. Dow Started up a new ethylene cracking furnace, H-091, on April 13, 2021. This new cracking furnace will be included in our next site noise model update. There were no other improvement/corrective action implemented in 2021 at Dow plants.
- 2. Enbridge Construction of a new storage tent is planned for July 2022, noise may increase slightly at this time due to the construction activities. No changes to site noise modeling is anticipated.
- 3. IPL HPC Facility still under construction and partial commissioning. Fence Line noise measurement scheduled for mid-2023 when the facility is expected to reach steady state operation.
- Pembina Final measurements required in RFS II/III to finalize model from theoretical to actual. Work was postponed in 2021 due to Covid-19 site restrictions. Work will be completed in 2022.
- 5. Plains Midstream Construction activities commenced on the installation of new pumps to support cavern storage activities. Construction activities commenced on the remediation of infrastructure affected by the emergency event on September 21, 2022. The new pumps have not commenced operation in 2021. The new pumps may result in changes that require the facility to update the Regional Noise Model. An update, if required, will be conducted in conjunction with the next regional noise model update.
- 6. Nutrien Redwater Nitric Acid Process Unit silencers were installed in summer 2021 on the compressor kickback line, as well as, the centrifugal air compressor discharge vent line (CVM exit vent line). Noise level may be slightly reduced. Ammonia II Process Unit compressor / gas turbine (CGT-902) was replaced in summer 2021. The noise level should be relatively similar. Redwater facility will be updating the site noise model in 2022.
- NWRP Environmental Noise abatement was included in the design and initial build specifications for the NWR Refinery. A noise mpa/survey is being completed in 2022. Delayed due to non-design operational conditions prior to May 2021. Failed silencer (Unit 40 gasifier) to be replaced during 2022 fall turnaround. Site noise model will incorporate this change.

# 5.2 Noise Complaints in 2021 (Appendix 2)

Nutrien FNO - We received a neighbor complaint on 30-JUNE-2021. The resident called Sherritt security, reporting a noise that sounded like "equipment running" in the evening(s). Over the next several weeks, Sherritt and Nutrien both completed independent noise monitoring – both days and nights - using "grab sample" monitors. Readings from the grab samples showed **no indication of excess noise levels**. Grab samples also aligned with the NCIA noise modelling / mapping. On 19-



JULY-2021 a meeting was held with Cory Wald (Nutrien), Greg Poholka (Sherritt) and Laurie Danielson (NCIA) and it was agreed that no further action was necessary, other than following up with the resident. Cory spoke with the resident the same day and informed him of the findings (none) and decision.

- 2. NWRP Noise complaints related to bird cannon discharge. Issue was related to another facility, but complaint was registered with our facility as well to cover all bases.
- 3. Sherritt Received a noise complaint from a resident of Fort Saskatchewan on June 29, 2021 (same complaint as in 1 above). The resident advised that a "steady roar" could be heard some nights between 10pm and 5am, when outside temperatures are warm. The noise was not heard every night and was not heard during the day or through the winter months. **Actions taken**: Call out to Site units and Oerlikon, Umicore and Nutrien. Nutrien sent personnel out to investigate and collect measurement readings. The investigation did not reveal any abnormal or elevated measurements when compared with historical sound modelling. The complaint was closed after the investigation was completed with no additional follow up requirements. The NCIA and AEP were advised of the incident at the time of occurrence.

#### 5.3 Other Items for Follow-up Based on 2021 Field Measurements

- The NWR Sturgeon Refinery not yet included in the Existing Case RNM (that will change for the next RNM update in 2023, delayed by one year owing to Covid-19 restrictions).
- 2. The IPL Heartland Petrochemical Complex that is not yet included in the RNM but will be for the next update in 2023.
- 3. We will continue to conduct annual field monitoring and compare it to the RNM predicted ranges.
- 4. As noted with the trend analysis, Figure 4 of this report, there is no clear trend (up or down) of measured noise levels in the region.

#### 5.4 Next Steps for 2022/2023

- 1. Mostly captured in Section 5.1 above.
- 2. Update Regional Noise Model in mid to late 2023 with updated or new site models from the following (as we understand this today):
  - Cenovus
  - Conifer Energy
  - Dow
  - Inter Pipeline HPC
  - Keyera
  - North West Redwater Partnership (new model, validated) and moved to Case 1
  - Nutrien Redwater
  - Pembina Redwater





- Plains Midstream
- Shell; and
- Remove the Suncor noise model from Cases 2 and 3 (as it will never be built)



# **APPENDIX 1**

# 2021 Regional Noise Model Annual Field Validation Monitoring Report



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# 2021 Environmental Noise Survey

For The

# **Regional Noise Model Annual Field Validation Monitoring**

# Prepared for: Northeast Capital Industrial Association

Prepared by: P. Froment, B.Sc., B.Ed., P.L.(Eng.) aci Acoustical Consultants Inc. Edmonton, Alberta APEGA Permit to Practice #P7735

PERMIT TO PRACTICE ACI ACOUSTICAL CONSULTANTS INC.
12/03/2021
PERMIT NUMBER: P7735 The Association of Professional Engineers, Geologists and Geophysicists of Alberta

01/12/2022

aci Project #: 21-021 January 12, 2022

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#### **Executive Summary**

**a**Ci Acoustical Consultants Inc., of Edmonton AB, was retained by the Northeast Capital Industrial Association (NCIA) to conduct an environmental noise survey within Alberta's Industrial Heartland (AIH). The purpose of the study was to conduct a single 48-hour noise monitoring at eleven (11) prespecified locations within the AIH. An additional noise monitoring, spanning two (2) 48-hour periods, was conducted at a  $12^{th}$  monitoring location (referred to as Location 12) as an independent control/reference point. The noise monitoring was conducted in support of the NCIA's Regional Noise Management Plan. In addition, the results from these noise monitoring's will be used to validate the Regional Noise Level Assessment Model (the Regional Noise Model). All noise monitoring procedures and equipment used was in accordance with the requirements of the Alberta Energy Regulator (AER) Directive 038 on Noise Control. Site work was conducted for **aCi** in July 2021 by P. Froment, B.Sc., P.L.(Eng.).

As part of the study, a total of thirteen (13) 48-hour noise monitoring's were conducted throughout the Alberta's Industrial Heartland. In many cases, the weather conditions during the 48-hour time monitoring periods resulted in noise levels representing the typical noise climate of each noise monitoring location. As such, the isolated noise levels and 1/3 octave band L<sub>eq</sub> sound levels were consistent between night-time periods and when compared to previous years.

The noise levels at most locations consisted of low frequency components with occasional mid/high frequency components that could be attributed to the nearest facility relative to each individual noise monitoring location. Despite the noise being relatively low in frequency, none of the sites indicated any low frequency tonal components. The results from 2021 indicated that the isolated  $L_{eq}$ Night noise levels in many of noise monitoring locations have stabilized. Lastly, based on the results from recent years it is apparent that rail activity is now a major noise source within the entire Heartland region.



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### 1.0 Introduction

**□CI** Acoustical Consultants Inc., of Edmonton AB, was retained by the Northeast Capital Industrial Association (NCIA) to conduct an environmental noise survey within Alberta's Industrial Heartland (AIH). The purpose of the study was to conduct a single 48-hour noise monitoring at eleven (11) prespecified locations within the AIH. An additional noise monitoring, spanning two (2) 48-hour periods, was conducted at a 12<sup>th</sup> monitoring location (referred to as Location 12) as an independent control/reference point. The noise monitoring was conducted in support of the NCIA's Regional Noise Management Plan. In addition, the results from these noise monitoring's will be used to validate the Regional Noise Level Assessment Model (the Regional Noise Model). All noise monitoring procedures and equipment used was in accordance with the requirements of the Alberta Energy Regulator (AER) Directive 038 on Noise Control. Site work was conducted for **□CI** in July 2021 by P. Froment, B.Sc., P.L.(Eng.).

#### 2.0 Location Description

Alberta's Industrial Heartland (AIH) is located northeast of Edmonton, AB and extends into five different municipalities as indicated in <u>Figure 1</u>. This includes 533 km<sup>2</sup> within the City of Fort Saskatchewan and the Counties of Lamont, Strathcona and Sturgeon, in addition to 49 km<sup>2</sup> in the City of Edmonton's "Edmonton Energy and Technology Park". The area has 40+ companies in various sectors that include producing and processing oil, gas, and petrochemicals in addition to advanced manufacturing.

Topographically, the AIH does have some varying elevation changes however in general it can be considered relatively flat with no substantial hills. Areas with more significant changes in elevation are found adjacent to the North Saskatchewan River (the River) which divides the AIH from the southwest to the northeast (excluding the AIH area within the City of Edmonton's limits). The vegetation varies from open grain fields to thick dense vegetation. Due to the relative distance from the noise monitoring locations to the nearby facilities (apart from Noise Monitor Location 12) and the relatively low frequency nature of the industrial noise, the level of vegetative sound absorption is considered negligible to low.



#### 3.0 Measurements Methods

As part of the study, a total of thirteen (13) 48-hour noise monitoring's were conducted at 12 locations<sup>1</sup> throughout the AIH, as indicated in <u>Figure 2</u>. The monitoring's were conducted under summer conditions and tried to avoid times of precipitation and high wind-speeds based on weather forecasts.

Apart from Noise Monitor Location 4 & 11<sup>2</sup>, all noise monitoring locations were identical to those conducted during the 2020 Noise Survey. The noise monitoring was conducted collecting broadband A-weighted and C-weighted as well as 1/3 octave band sound levels and were conducted during "typical" operations at all facilities<sup>3</sup>. In particular, the chosen noise monitoring periods avoided any major shutdowns or outages<sup>4</sup> of nearby facilities that could adversely affect the "typical" noise levels (either louder or quieter) for a given region. Each noise monitoring was accompanied by a 48-hour digital audio recording for more detailed post process analysis.

Three (3) (July 6 - 8, 2021) and three (3) (July 29 - 31, 2021) local weather monitoring stations were used for the two (2) 48-hour time monitoring periods. The weather monitors obtained the wind speed, wind direction, temperature, relative humidity, barometric pressure, and rain fall data in 15-second sampling periods. Lastly, it should be noted that all measurements were performed in accordance with the methods described in the AER Directive 038 on Noise Control.

<sup>&</sup>lt;sup>4</sup> This was based on information provided by the various NCIA members.



<sup>&</sup>lt;sup>1</sup> Once again, it should be noted that two (2) 48-hour monitoring were conducted at Monitoring Location 12.

<sup>&</sup>lt;sup>2</sup> As discussion on their new placements will be discussed in each individual section.

<sup>&</sup>lt;sup>3</sup> This was verified by all the various company representatives.

#### 4.0 Noise Monitoring Location Description

In addition to Table 1, which provides the UTM coordinates and the start and end times for each noise monitoring, a brief discussion of each noise monitoring location can be found below. All noise measurement instrumentation was calibrated at the start of the measurements and then checked afterwards to ensure that there had been no significant calibration drift over the duration of the measurements. Refer to <u>Appendix I</u> for a detailed description of the measurement equipment used and for all calibration records.

Monitoring Location	UTM Coordinates (Approximate)		Start Time	End Time	
	Easting	Northing			
	(m)	(M)			
1D	355210	5954157	7/29/21 9:00	7/31/21 9:00	
2	358256	5957216	7/06/21 12:00	7/08/21 12:00	
3B	358361	5959283	7/06/21 12:00	7/08/21 12:00	
4D	<b>4D</b> 361694		7/29/21 7:30	7/31/21 7:30	
5	361777	5964711	7/06/21 12:00	7/08/21 12:00	
6	364322	5967894	7/29/21 8:00	7/31/21 8:00	
8A	8A 358897		7/06/21 12:00	7/08/21 12:00	
9	355872	5957574	7/06/21 12:00	7/08/21 12:00	
10	355925	5955818	7/06/21 11:30	7/08/21 11:30	
11B	358332	5963775	7/06/21 12:00	7/08/21 12:00	
<b>12B</b> (1 <sup>st</sup> 48-hour)	260222	5963070	7/06/21 12:00	7/08/21 12:00	
12B (2 <sup>nd</sup> 48-hour)	300223		7/29/21 8:30	7/31/21 8:30	
13	358667	5970180	7/06/21 12:00	7/08/21 12:00	

Table 1. Noise Monitoring Locations with Start and End Times<sup>1</sup>

# 4.1. Noise Monitor Location 1

The noise monitor at Location 1 was located approximately 10 m north of 100 Avenue<sup>2</sup>, 160 m west of 114 Street and approximately 395 m northwest of Highway 15 as indicated in Figure 2 and Figure 3. This put the noise monitor approximately 380 m southwest of the Sherritt International Corporation facility. This is the southernmost noise monitoring location found within the AIH. At this location, there was direct line-of-sight to 100 Avenue, Mel Martin's Transfer Facility, and the Sherritt International Corporation facility. There was no significant vegetation between the noise monitor and the facilities to the north. It should be noted that the microphone for this measurement was placed on top of a mobile monitoring station

<sup>&</sup>lt;sup>2</sup> This is consistent with the new location chosen last year.



<sup>&</sup>lt;sup>1</sup> The letters accompanying the noise monitoring location refer to their location.

at a height of 2.5 m from the ground. In addition, a weather monitor was placed at this location adjacent to the noise monitor for the duration of the July 27 - 29, 2021 noise monitoring period.

# 4.2. <u>Noise Monitor Location 2</u>

The noise monitor at Location 2 was located approximately 90 m southeast of 125 Street and approximately 1.0 km north of Highway 15 as indicated in <u>Figure 2</u> and <u>Figure 4</u>. This put the noise monitor approximately 120 m west of the Dow yard, 170 m north of the Dow rail yard and approximately 850 m east-southeast of the Keyera Facility. At this location, there was direct line-of-sight to Dow's main site to the east and to the rail yard to the south. There was no significant vegetation between the noise monitor and the facilities.

# 4.3. Noise Monitor Location 3

The noise monitor at Location 3 was located approximately 10 m east of 125 Street, 275 m south of the CN Rail line 55 m east of the north entrance to the Plains Midstream Facility and approximately 125 m north of the entrance to the Petrogas northern entrance as indicated in Figure 2 and Figure 5. This put the noise monitor approximately 230 m northwest of the Petrogas facility and approximately 380 m east of major equipment at the Plains Midstream Facility. At this location, there was direct line-of-sight to the Plains Midstream Facility but not to the Petrogas site. There was no significant vegetation between the noise monitor and the facilities.

#### 4.4. Noise Monitor Location 4D

The noise monitor at Location 4 was located approximately 750 m south of the south fence line of the Shell Scotford site and approximately 1.6 km east of Range Road 220 (130 Street) as indicated in Figure 2 and Figure 6. This put the noise monitor at 20 m south of the entrance to the electrical substation to the northwest. At this location, there was direct line-of-sight to the Shell Scotford site but not to the electrical substation to the northwest. There was no significant vegetation between the noise monitor and the Shell Scotford facility. This location was modified from previous years due to construction occurring in the field to the east of Range Road 215 and south of Township Road 554.

# 4.5. Noise Monitor Location 5

The noise monitor at Location 5 was located approximately 200 m north of Township Road 560A and 5 m east of Range Road 215 as indicated in <u>Figure 1</u> and <u>Figure 7</u>. This put the noise monitor approximately 300 m north of the north fence line for the Shell Scotford facility and approximately 135 m west of an industrial yard to the east. At this location, there was direct line-of-sight to the Shell Scotford site but not



the industrial yard (due to the topography of the area). There was no significant vegetation between the noise monitor and the Shell Scotford facility.

### 4.6. Noise Monitor Location 6

The noise monitor at Location 6 was located approximately 1.0 km north of Township Road 562 and 3 m east of Range Road 213A as indicated in Figure 1 and Figure 8. This put the noise monitor approximately 1.6 km east of the Nutrien Redwater facility. Due to favorable topography between the noise monitor and Nutrien there was direct line-of-sight to the Nutrien site through a small row of deciduous trees across the road. There was no significant vegetation between the noise monitor and the Nutrien facility. In addition, a weather monitor was placed at this location adjacent to the noise monitor for the duration of the July 27 - 29, 2021 noise monitoring period.

# 4.7. Noise Monitor Location 8

The noise monitor at Location 8 was located approximately 1.6 km south of Highway 643 (eastbound) and 365 m east of Range Road 221 as indicated in <u>Figure 2</u> and <u>Figure 9</u>. This put the noise monitor approximately 30 m north of the northern fence line for the Pembina/Williams facility. At this location, there was direct line-of-sight to the Pembina/Williams site through a thin row of deciduous trees. There was no significant vegetation between the noise monitor and the aforementioned facilities.

# 4.8. Noise Monitor Location 9

The noise monitor at Location 9 was located approximately 5 m southwest of the intersection of Lamoureux Drive and Godbout Avenue as indicated in Figure 2 and Figure 10. This put the noise monitor approximately 1.2 km northwest of the major structures at the Dow facility and approximately 1.3 km west of the Keyera facility. Due to favorable topography, there was direct line-of-sight to the facilities across the River through a thin row of deciduous trees<sup>1</sup>. Despite the thin row of trees there was no significant vegetation between the noise monitor and the aforementioned facilities.

# 4.9. Noise Monitor Location 10

The noise monitor at Location 10 was located approximately 30 m west of 119 Street and 12 m north of the access road to the Nutrien Fort Saskatchewan facility as indicated in Figure 2 and Figure 11. This put the noise monitor approximately 750 m northeast of the major structures at the Nutrien facility and approximately 180 m west of the west fence-line of the Dow facility. There was direct line-of-sight to the

<sup>&</sup>lt;sup>1</sup> This was observable during the night-time period.



Dow facility but not to the Nutrien facility (due to the topography of the area). There was no significant vegetation between the noise monitor and the aforementioned facilities. In addition, a weather monitor was placed at this location adjacent to the noise monitor for the duration of the July 6 - 8, 2021 noise monitoring period.

#### 4.10. Noise Monitor Location 11

The noise monitor at Location 11 was located approximately 5 m south of Township Road 560 and 130 m west of Range Road 221 as indicated in Figure 2 and Figure 12. This put the noise monitor approximately 1.8 km southwest of the major structures at the Pembina/Williams facility and approximately 20 m north of the Cando Sturgeon Rail Terminal. At this location, there was no direct line-of-sight to the Pembina/Williams facility and its the new rail terminal. There was moderate vegetation between the noise monitor and the facilities to the northeast. In addition, a weather monitor was placed at this location adjacent to the noise monitor for the duration of the July 6 - 8, 2021 noise monitoring period. Lastly, this new location was selected due to access and visibility concerns of the previous monitoring location.

#### 4.11. Noise Monitor Location 12

The noise monitor at Location 12 was the independent control/reference point. It was located approximately 15 m east of Range Road 211 and 450 m south of Township Road 560 as indicated in Figure 2 and Figure 13. This placed the noise monitor approximately 1.6 km west of Highway 830 and approximately 2.7 km north of Highway 15. At this location, there was direct line-of-sight to the west of the AIH region. The noise monitor was bordered on all sides by a combination of open grassy fields. Due to the distance from the noise monitor to the existing major facilities within the AIH, the vegetative absorption between the noise monitor and these facilities would be considered significant. Note also that a weather monitor was placed at this location for the duration of all noise monitoring periods.

#### 4.12. Noise Monitor Location 13

The noise monitor at Location 13 was located approximately 3 m east of Range Road 221 and 100 m south of Township Road 564 as indicated in <u>Figure 2</u> and <u>Figure 14</u>. This put the noise monitor approximately 1.1 km northwest of the lay down yard for the NWR facility and is the north easternmost noise monitoring location found within the AIH. At this location, there was no direct line-of-sight to any facilities. There was moderate vegetation between the noise monitor and the aforementioned facilities.



# 5.0 Equivalent Sound Level & Statistical Descriptors

Environmental noise levels from industry are commonly described in terms of equivalent sound levels or  $L_{eq}$ . This is the level of a steady sound having the same acoustic energy, over a given time period, as the fluctuating sound. The concept is that the same amount of annoyance occurs from a sound having a high level for a short period of time as from a sound at a lower level for a longer period of time. In addition, this energy averaged sound level is often A-weighted to account for the reduced sensitivity of average human hearing to low frequency sounds and/or C-weighted to allow for more low frequency noise to be considered. These  $L_{eq}$  in dBA/dBC, which are the most common environmental noise measure, are often given for day-time (07:00 to 22:00)  $L_{eq}$ Day and night-time (22:00 to 07:00)  $L_{eq}$ Night while other criteria use the entire 24-hour period as  $L_{eq}$ 24.

Another method of conveying long term noise levels utilizes statistical descriptors. These are calculated from a cumulative distribution of the sound levels over the entire measurement duration and then determining the sound level at xx % of the time. These descriptors can be used to provide a more detailed analysis of the varying noise climate.

For purposes of this study, the following equivalent sound levels and statistical descriptors will be presented and discussed:

LeqDay	- Measured over the daytime (07:00 – 22:00)
LeqNight	- Measured over the night-time (22:00 – 07:00)
L10	<ul><li>Sound level that was exceeded only 10% of the time.</li><li>Good measure of intermittent or intrusive noise</li></ul>
L50	- Sound level that was exceeded 50% of the time (arithmetic average) - Good to compare to $L_{eq}$ to determine steadiness of noise
L90	<ul><li>sound level that was exceeded 90% of the time</li><li>Good indicator of typical "ambient" noise levels</li></ul>

For further information, refer to <u>Appendix II</u> for a description of the acoustical terminology and <u>Appendix III</u> for a list of common noise sources and their associated noise levels.



#### 6.0 <u>Results and Discussion</u>

#### 6.1. Environmental Noise Monitoring

The results of the thirteen (13) 48-hour noise monitoring's have been provided in Table 2<sup>1</sup> and are presented in Figures 15 – 105. The figures include the 15-second broadband dBA and dBC  $L_{eq}$  sound levels<sup>2</sup>, 1-hour dBA and dBC,  $L_{90}$ ,  $L_{50}$ ,  $L_{10}$  sound levels<sup>3</sup> and the 1/3 octave band  $L_{eq}$  sound levels<sup>3</sup> for each noise monitoring location. Table 2 provides results of each of the three daytime periods in addition to the isolated and non-isolated values for the two night-time periods. The isolation analysis for the night-time periods was performed in accordance with Section 4.3.2 of the AER Directive 038. A list of all non-typical noise events removed from each of the thirteen (13) noise monitoring's are provided in Appendix IV. Each event removed has been dated with its corresponding time period as well as the rationale for its removal. A detailed discussion of the results for each monitoring location can be found below.

Monitoring Location	1st Daytime Period	1st Night-time Period (Non- isolated)	1st Night-time Period (Isolated)	2nd Daytime Period	2nd Night-time Period (Non- isolated)	2nd Night-time Period (Isolated)	3rd Daytime Period
1D	59.9	54.5	51.9	55.5	52.3	51.0	50.7
2	52.4	50.3	47.3	50.9	53.7	48.9	53.2
3B	53.3	52.6	45.1	54.7	54.2	47.1	53.4
4D	53.6	51.1	50.9	47.8	44.3	43.6	45.5
5	52.5	63.4	52.7	54.1	65.4	53.2	52.4
6	55.3	48.1	47.4	55.4	44.5	44.5	46.0
8a	47.0	46.8	46.5	46.2	47.7	46.2	46.7
9	49.2	45.8	44.3	56.9	47.0	45.4	54.7
10	58.0	54.3	50.0	58.1	56.5	51.1	58.1
11B	47.5	44.8	38.7	46.7	45.6	38.7	52.1
<b>12b</b> (1 <sup>st</sup> 48-hour)	44.3	41.4	36.4	46.1	43.2	35.2	44.8
12b (2nd 48-hour)	49.7	42.5	32.0	44.3	44.2	30.6	41.2
13	40.6	43.2	39.3	49.0	41.3	38.0	50.4

Table 2. 2021 - Leg 24-Hour Results<sup>4</sup>

<sup>&</sup>lt;sup>4</sup> The letters accompanying the noise monitoring location refers to their location.



<sup>&</sup>lt;sup>1</sup> The results of each location will be discussed individually.

 $<sup>^{2}</sup>$  The data provided in the 15-second L<sub>eq</sub> traces shows the 24-hour time period with the isolated night-time results, after removal of non-typical noise levels. This was done to indicate the relative steadiness of the noise levels and to make it easier to view the night-time data.

<sup>&</sup>lt;sup>3</sup> Isolated and non-isolated values are presented.

#### 6.1.1. Noise Monitoring Location 1D

The results of the noise monitoring conducted at Location 1 are provided in Table 2 and in Figures 15 - 21. The isolated  $L_{eq}$ Night values in Table 2 are very consistent between the two night-time periods (less than 1 dBA) although the traces found in Figures 15 - 18 indicate more variability between the two night-time periods. Despite the differences in the traces the  $L_{eq}$ Night noise levels correspond well with previous years.

Despite the relative difference in traces between both nights the 1/3 octave band  $L_{eq}$  sound levels have very similar traces. They both have relatively higher noise levels in the lower frequency bands that decrease as the frequency increases. Due to the very favorable weather conditions during both nights and to the similar  $L_{eq}$ Night values, it is anticipated that the isolated values of both night-time periods are representative of the typical noise climate of the area.

#### 6.1.2. Noise Monitoring Location 2

The results of the noise monitoring conducted at Location 2 are provided in Table 2 and in Figures 22 - 28. The isolated  $L_{eq}$ Night values from Table 2 and the traces found in Figures 22 - 23 indicate very consistent noise levels between the two night-time periods (difference of 1.6 dBA). The isolated 1/3 octave figures show relatively broadband noise levels, particularly in the mid-frequency bands, with elevated noise levels in the lower (below 125 Hz) frequency bands which is consistent with previous noise surveys. As indicated in Appendix IV, the "non-typical" incidents included a relatively significant amount of rail activity. The removal of data due to the rail yard is consistent with previous years.

Based on the isolated  $L_{eq}$ Night results and the 1/3 octave band spectral data, it would be anticipated that the results from the 2021 noise monitoring are reflective (in comparison to previous years) of the typical range of noise levels for this area.

# 6.1.3. Noise Monitoring Location 3B

The results of the noise monitoring conducted at Location 3 are provided in Table 2 and in Figures 29 - 35. The isolated  $L_{eq}$ Night values are relatively consistent between the two night-time periods, however the noise levels are slightly higher during the second night which could be attributed to the varying differences between the operations at the adjacent facilities between the two nights. Although the trace for the night-time periods varies, their 1/3 octave band spectral data is similar, again with the second night being slightly higher than the first night.



When comparing the noise levels of each night-time period to previous years, the results of both nights are indicative of the typical range of the noise climate for this area.

# 6.1.4. Noise Monitoring Location 4D

The results of the noise monitoring conducted at Location 4 are provided in Table 2 and in Figures 36 - 42. It should again be noted that this location was moved from previous years due to construction occurring adjacent to the last year's monitoring location. This year's location was approximately 450 m closer to the facility to the north, therefore it would be anticipated that the noise levels would be higher, however, the results did not support this.

Similarly to previous years, the isolated  $L_{eq}$ Night values between the two night-time periods were significantly different. The first night-time period (Figure 36) indicates a very consistent trace with stable noise levels. The trace of the isolated  $L_{eq}$ Night noise levels for the second night-time period, (Figure 37) indicates consistent noise levels from 22:00 – 00:00 before the noise levels decrease significantly. In reviewing the weather data for this night-time period, there isn't a change in wind speed or direction that would account for the reduction in the noise levels. Thus, it is possible that there was a change in operation.

Based on the results, it is anticipated that when compared to previous years, the isolated values of the July 29 - 30, 2021 night-time period are representative of the higher end of the noise climate of the area, while the July 30 - 31, 2021 night-time period is reflective of the low to mid-end of the typical noise climate of the area.

# 6.1.5. Noise Monitoring Location 5

The results of the noise monitoring conducted at Location 5 are provided in Table 2 and in Figures 43 - 49. Figures 43 - 46 indicate very consistent isolated  $L_{eq}$ Night noise levels & 15-second  $L_{eq}$  traces for both night-time periods. As noted in <u>Appendix IV</u>, there was again a significant number of "non-typical" incidents removed this year for rail activity when compared to 3 – 4 years ago. Therefore, it would be anticipated that this activity is now "typical" for the area.

When comparing the noise levels of each night-time period to previous years, the results of both nights are indicative of the typical range of the noise climate for this area. This was anticipated based on the favorable weather conditions.



# 6.1.6. Noise Monitoring Location 6

The results of the noise monitoring conducted at Location 6 are provided in Table 2 and in Figures 50 - 56. The isolated 15-second L<sub>eq</sub> trace in Figure 50, from July 29 – 30, 2021, indicates relatively consistent noise levels throughout the entire night-time period. During the site visit it was noted that the dominant noise source was from the facility to the west, though crickets could be heard. As noted during the July 30 - 31, 2021 site visit, the facility to the west was not dominant and not audible, instead the contributions of crickets were noted to be dominant. This is consistent with the 1/3 octave band spectral data where there are elevated noise levels in the higher frequency bands (between 6.3 kHz -8 kHz). A similar 1/3 octave band trace was measured during the 2020 monitoring period, however, during the 2020 site visits, the crickets were not observed and thus not identified. Therefore, in future noise monitoring periods, it will be noted that higher frequency contributions are likely attributed to the presence of crickets.

When compared to previous years, it can thus be concluded that the measured  $L_{eq}$ Night values from the July 29 – 30, 2021 night-time period are reflective of the noise climate of the area when the noise contributions from the facility to the west are dominant.

#### 6.1.7. Noise Monitoring Location 8A

The results of the noise monitoring conducted at Location 8 are provided in Table 2 and in Figures 57 - 63. The isolated  $L_{eq}$ Night values indicate very consistent noise levels for both night-time periods. Similarly to other locations during the July 6 – 8, 2021 monitoring period, the  $L_{eq}$ Night noise levels are very similar due to the weather conditions being very similar between both nights. The similarities are also reflected in the 1/3 octave band  $L_{eq}$  sound levels as both nights are almost identical. Furthermore, 1/3 octave band  $L_{eq}$  sound levels are consistent with previous years. Therefore, the isolated noise levels of both 2021 night-time periods are representative of the typical noise climate of this area.

# 6.1.8. Noise Monitoring Location 9

The results of the noise monitoring conducted at Location 9 are provided in Table 2 and in Figures 64 - 70. The isolated  $L_{eq}$ Night values indicate very consistent noise levels for both night-time periods. Similarly to other locations during the July 6 – 8, 2021 monitoring period, the  $L_{eq}$ Night noise levels are very similar due to the weather conditions being very similar between both nights. The similarities are also reflected in the 1/3 octave band  $L_{eq}$  sound levels as the trace between both nights are almost identical. Furthermore, 1/3 octave band  $L_{eq}$  sound levels are consistent with previous years.



When comparing the values of each night-time period to previous years the results of each night are indicative of the typical noise climate of the area.

# 6.1.9. Noise Monitoring Location 10

The results of the noise monitoring conducted at Location 10 are provided in Table 2 and in Figures 71 - 77. The isolated  $L_{eq}$ Night values from Table 2 and the traces found in Figure 71 - 72, indicate relatively consistent noise levels for both night-time periods. The isolated 1/3 octave figures indicate relatively broadband noise levels, particularly in the mid-frequency bands, with elevated noise levels in the lower (below 125 Hz) frequency bands which is consistent with previous noise surveys.

Similarly to other noise monitoring locations for the July 6-8, 2021 noise monitoring period, the variance in noise levels between the two night-time periods is relatively minimal. Based on the isolated L<sub>eq</sub>Night results and the 1/3 octave band spectral data, it would be anticipated that the results from the 2021 noise monitoring for both nights, are reflective of the typical range of noise levels for this area.

# 6.1.10. Noise Monitoring Location 11B

The results of the noise monitoring conducted at Location 11 are provided in Table 2 and in <u>Figures 78 - 84</u>. It should again be noted that this location was moved from previous years due to access and visibility concerns of the previous monitoring location. However, based on the significant amount of rail activity during the night-time (as noted in <u>Appendix IV</u>), it is recommended that the 2022 noise monitoring be conducted at its previous location.

Despite the significant amount of data removed, as indicated in Table 2, the isolated  $L_{eq}$ Night values from each night-time period were identical. When comparing the results to previous years and when considering the additional distance to the new monitoring location, the isolated values of both 2021 night-time periods are consistent with the anticipated noise levels of this area.

# 6.1.11. Noise Monitoring Location 12

The results of the noise monitoring conducted at Location 12 are provided in Table 2 and in <u>Figures 85 - 98</u>. As previously mentioned, this location was the independent control/reference point. Therefore, the results from this location span two (2) 48-hour monitoring periods.

Similarly to previous years, all night-time periods show significant differences between the non-isolated  $L_{eq}$ Night noise levels in comparison to the isolated  $L_{eq}$ Night noise levels. This can be attributed to this



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location being relatively far any major facility<sup>1</sup>, therefore most instances of vehicular traffic on Range Road 211 or rail activity along the nearby CP rail line dominate the noise climate. In addition, during all night-time periods there were significant noise contributions from the rail line, the morning rush (on Highway 211) and the morning chorus (birds chirping). These noise sources totally dominated the noise climate and thus large portions of this time period were removed<sup>2</sup>.

In the absence of the vehicular or rail activity the 1/3 octave band  $L_{eq}$  sound levels indicate a similar trace to the other monitoring locations with elevated noise levels in the lower frequency bands (50 Hz – 80 Hz) that gradually decrease as the frequency increases. However, similarly to the 2020 monitoring period, the presence of the contributions from the crickets and birds (3.15 – 5.0 kHz) is very pronounced.

#### 6.1.12. <u>Noise Monitoring Location 13</u>

The results of the noise monitoring conducted at Location 13 are provided in Table 2 and in Figures 99 - 105. The isolated  $L_{eq}$ Night values in Table 2 and the trace found in Figure 99, indicated that the July 6 – 7, 2021 noise levels were very consistent throughout the entire night-time period. Although the July 7 – 8, 2021 noise levels are not as consistent as the previous night, the 1/3 octave band  $L_{eq}$  sound levels between the two nights is similar with slightly higher noise levels in the mid frequency bands (between 315 Hz - 1.25 kHz).

Similarly to the 2020 monitoring period, the isolated  $L_{eq}$ Night values are again consistent and within range of highest and lowest values, respectively. As a result, based the results from 2021 & 2020, it is anticipated that the noise climate of the area has stabilized due to the completion of facilities to the southeast of this monitoring location.

<sup>&</sup>lt;sup>2</sup> This has been very consistent between the various years.



<sup>&</sup>lt;sup>1</sup> This location is approximately 2.3 km northeast of the ATCO Natural Gas Salt Cavern Storage Site.

#### 6.2. 2021 General Subjective Observations and Notes from Site Visits and Data Analysis

- The July 6 8, 2021 night-time periods resulted in very consistent noise levels throughout the entire study area. Consequently, the results for most noise monitoring locations in 2021 are reflected on the "typical" noise climate of each individual study area.
- The isolated noise levels and 1/3 octave band  $L_{eq}$  sound levels were more consistent when compared to the 2020 noise monitoring period.
- The noise arriving at most monitor locations consisted primarily of low frequency components that gradually decreased in noise level as the frequency increased.
- None of the sites indicated any specific low frequency tonal components.
- The noise from train passages was prevalent at all locations and tended to dominate the noise climate as they passed through, particularly when there were train whistles.
- Based on the past few years (2018 2021) it is apparent that rail activity is a major noise source within AIH.
- The almost ideal weather conditions for most monitoring locations resulted in consistent results between the two night-time monitoring periods and also when compared to previous years.
- In 2020, the contributions from the morning chorus (birds chirping, animals moving, etc.) were dominant at many locations after approximately 04:30 in the morning. Initially the 2021 noise monitoring was going to avoid performing the noise monitoring near the summer solstice (June 20, 2021). However, based on the shutdown schedule of most facilities and due to favorable weather conditions, early July 2021 was selected for the first noise monitoring period. As indicated in <u>Appendix IV</u> there was significantly less data removed for these "non-typical" events in 2021. Therefore, in future noise monitoring years, this issue will be considered, however it might not be weighted as heavily as first thought in 2020.
- The L<sub>eq</sub>Night noise levels in many of noise monitoring locations have stabilized within the past 2 years. This is evidenced when comparing to historical values.
- Based on the amount of rail activity at Noise monitoring location 11B it is recommended that the 2022 noise monitoring be conducted at its previous location (11A).


#### 6.3. <u>Night-time Weather Conditions</u>

Local weather monitoring stations were used throughout all noise monitoring periods to obtain the wind speed, wind direction, temperature, relative humidity, barometric pressure, and rain fall data in 1-minute sampling periods. Note that the weather conditions for noise monitoring periods were within acceptable limits as per AER D038. All weather data are presented in <u>Appendix V</u>. A brief discussion of each night-time period can be found below.

## 6.3.1. July 6 - 7, 2021

## Weather Monitor near Noise Monitor Location 10

The wind conditions during the night-time period were considered moderate (primarily between 5 - 10 km/hr). The wind was predominantly from the south-east for the duration of the night-time period. The temperature ranged from  $11^{\circ}$ C to  $17^{\circ}$ C and the relative humidity ranged from approximately 67% - 90%. The barometric pressure was consistent and flat at approximately 94 kPa. Lastly, there was no precipitation during the night.

## Weather Monitor near Noise Monitor Location 11

The wind conditions during the night-time period were considered moderate (primarily between 5 - 10 km/hr). The wind was g predominantly from the south-east for the duration of the night-time period. The temperature ranged from  $12^{\circ}$ C to  $16^{\circ}$ C and the relative humidity ranged from approximately 75% - 92%. The barometric pressure was consistent and flat at approximately 94 kPa. Lastly, there was no precipitation during the night.

#### Weather Monitor near Noise Monitor Location 12

The wind conditions during the night-time period were considered calm (primarily below 5 km/hr). The wind was generally from the south<sup>1</sup> for the duration of the night-time period. The temperature ranged from 10°C to 18°C and the relative humidity ranged from approximately 67% - 92%. The barometric pressure was consistent and flat at approximately 94 kPa. Lastly, there was no precipitation during the night.

<sup>&</sup>lt;sup>1</sup> The wind direction fluctuates more greatly when wind speeds are below 5 km/hr and are essentially calm. In these instances, the wind direction has a minimal influence of the propagation of the sound.



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6.3.2. <u>July 7 – 8, 2021</u>

#### Weather Monitor near Noise Monitor Location 10

The wind conditions during the night-time period were considered moderate to calm (primarily below 8 km/hr). The wind direction was initially from the northwest and the shifted to the southeast before varying<sup>1</sup>. The temperature ranged from 13°C to 29°C and the relative humidity ranged from approximately 24% - 86%. The barometric pressure was consistent and flat at approximately 94 kPa. There was no precipitation during the night.

## Weather Monitor near Noise Monitor Location 11

The wind conditions during the night-time period were considered moderate to calm (primarily below 8 km/hr). The wind direction was from the southeast at the start of the monitoring before varying in direction<sup>1</sup>. The temperature ranged from  $14^{\circ}$ C to  $23^{\circ}$ C and the relative humidity ranged from approximately 56% - 85%. The barometric pressure was consistent and flat at approximately 94 kPa. There was no precipitation during the night.

#### Weather Monitor near Noise Monitor Location 12

The wind conditions during the night-time period were considered calm (primarily below 5 km/hr). The wind direction was from varying directions<sup>1</sup> for the entire night-time period. The temperature ranged from 11°C to 28°C and the relative humidity ranged from approximately 63% - 92%. The barometric pressure was consistent and flat at approximately 94 kPa. There was no precipitation during the night.

<sup>&</sup>lt;sup>1</sup> The wind direction fluctuates more greatly when wind speeds are below 5 km/hr and are essentially calm. In these instances, the wind direction has a minimal influence of the propagation of the sound.



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#### 6.3.3. July 29 - 30, 2021

#### Weather Monitor near Noise Monitor Location 1

Apart from the start of the night-time, the wind conditions throughout the night-time period were considered calm to moderate (below 10 km/hr). The wind direction was generally from the north before shirting to various directions<sup>1</sup>. The temperature ranged from 14°C to 23°C and the relative humidity ranged from approximately 51% - 89%. The barometric pressure was consistent and flat at 94 kPa. Lastly, there was no precipitation.

## Weather Monitor near Noise Monitor Location 6

Apart from the start of the night-time, the wind conditions throughout the night-time period were considered calm to moderate to calm (below 10 km/hr). The wind direction was generally from the northeast before shirting to various directions<sup>1</sup>. The temperature ranged from 13°C to 22°C and the relative humidity ranged from approximately 56% - 93%. The barometric pressure was consistent at 94 kPa. Lastly, there was no precipitation.

## Weather Monitor near Noise Monitor Location 12

The wind conditions throughout the night-time period were considered calm to moderate (primarily below 10 km/hr). The wind direction varied throughout the night-time period which is consistent with the other weather monitoring locations. The temperature ranged from 12°C to 20°C and the relative humidity ranged from approximately 72% - 90%. The barometric pressure was flat at 94 kPa. Lastly, there was no precipitation.

<sup>&</sup>lt;sup>1</sup> The wind direction fluctuates more greatly when wind speeds are below 5 km/hr and are essentially calm. In these instances, the wind direction has a minimal influence of the propagation of the sound.



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6.3.4. July 30 - 31, 2021

Weather Monitor near Noise Monitor Location 1

The wind conditions throughout the night-time period were considered calm (below 5 km/hr). The wind direction varied throughout due to the calm wind conditions<sup>1</sup>. The temperature ranged from 14°C to 22°C and the relative humidity ranged from approximately 63% - 87%. The barometric pressure was consistent and flat at 94 kPa. Lastly, there was no precipitation.

## Weather Monitor near Noise Monitor Location 6

The wind conditions throughout the night-time period were considered calm (below 5 km/hr). The wind direction varied throughout due to the calm wind conditions1. The temperature ranged from 12°C to 22°C and the relative humidity ranged from approximately 60% - 93%. The barometric pressure was consistent and flat at 94 kPa. Lastly, there was no precipitation.

# Weather Monitor near Noise Monitor Location 12

The wind conditions throughout the night-time period were considered calm (primarily below 5 km/hr). The wind direction varied<sup>1</sup> throughout the night-time period which is consistent with the other weather monitoring locations. The temperature ranged from 13°C to 20°C and the relative humidity ranged from approximately 73% - 90%. The barometric pressure was flat at 94 kPa. Lastly, there was no precipitation.

<sup>&</sup>lt;sup>1</sup> The wind direction fluctuates more greatly when wind speeds are below 5 km/hr and are essentially calm. In these instances, the wind direction has a minimal influence of the propagation of the sound.



## 7.0 Conclusion

As part of the study, a total of thirteen (13) 48-hour noise monitoring's were conducted throughout the Alberta's Industrial Heartland. In many cases, the weather conditions during the 48-hour time monitoring periods resulted in noise levels representing the typical noise climate of each noise monitoring location. As such, the isolated noise levels and 1/3 octave band L<sub>eq</sub> sound levels were consistent between night-time periods and when compared to previous years.

The noise levels at most locations consisted of low frequency components with occasional mid/high frequency components that could be attributed to the nearest facility relative to each individual noise monitoring location. Despite the noise being relatively low in frequency, none of the sites indicated any low frequency tonal components. The results from 2021 indicated that the isolated  $L_{eq}$ Night noise levels in many of noise monitoring locations have stabilized. Lastly, based on the results from recent years it is apparent that rail activity is now a major noise source within the entire Heartland region.



## 8.0 <u>References</u>

- Environmental Noise Survey for the Regional Noise Model Annual Field Validation Monitoring,
  prepared for the NCIA by aci Acoustical Consultants Inc., (2015 2018)
- Alberta Energy Regulator (AER), Directive 038 on Noise Control, 2007, Calgary, Alberta
- International Organization for Standardization (ISO), *Standard 1996-1, Acoustics Description, measurement and assessment of environmental noise Part 1: Basic quantities and assessment procedures, 2003, Geneva Switzerland.*
- International Organization for Standardization (ISO), *Standard* 9613-1, *Acoustics Attenuation of* sound during propagation outdoors Part 1: Calculation of absorption of sound by the atmosphere, 1993, Geneva Switzerland.
- International Organization for Standardization (ISO), Standard 9613-2, Acoustics Attenuation of sound during propagation outdoors Part 2: General method of calculation, 1996, Geneva Switzerland.





Figure 1. Study Area





Figure 2. 2021 Study Area (With Noise Monitoring Locations)





Figure 3. Noise Monitor #1 (With Weather Monitor)



Figure 4. Noise Monitor #2





Figure 5. Noise Monitor #3



Figure 6. Noise Monitor #4





Figure 7. Noise Monitor #5



Figure 8. Noise Monitor #6





Figure 9. Noise Monitor #8



Figure 10. Noise Monitor #9





Figure 11. Noise Monitor #10



Figure 12. Noise Monitor #11





Figure 13. Noise Monitor #12 (Control Site w/ Weather Monitor)



Figure 14. Noise Monitor #13





Figure 16. Noise Monitor #1, 15-Second Levels (July 30 - 31, 2021)





Noise Monitor #1



Figure 18. Noise Monitor #1, 1-Hour Leq Sound Levels (July 30 - 31, 2021)





Figure 19. Noise Monitor #1, 1-Hour L<sub>10</sub>, L<sub>50</sub>, L<sub>90</sub> L<sub>eq</sub> Sound Levels (July 29 - 30, 2021)



Figure 20. Noise Monitor #1, 1-Hour L10, L50, L90 Leq Sound Levels (July 30 - 31, 2021)









Figure 23. Noise Monitor #2, 15-Second Levels (July 7 - 8, 2021)







Figure 24. Noise Monitor #2, 1-Hour Leg Sound Levels (July 6 - 7, 2021)



Figure 25. Noise Monitor #2, 1-Hour Leq Sound Levels (July 7 - 8, 2021)





Figure 26. Noise Monitor #2, 1-Hour L<sub>10</sub>, L<sub>50</sub>, L<sub>90</sub> L<sub>eq</sub> Sound Levels (July 6 - 7, 2021)



Figure 27. Noise Monitor #2, 1-Hour L<sub>10</sub>, L<sub>50</sub>, L<sub>90</sub> L<sub>eq</sub> Sound Levels (July 7 - 8, 2021)









Figure 30. Noise Monitor #3, 15-Second Levels (July 7 - 8, 2021)







Figure 31. Noise Monitor #3, 1-Hour Leg Sound Levels (July 6 - 7, 2021)

Figure 32. Noise Monitor #3, 1-Hour Leq Sound Levels (July 7 - 8, 2021)



Noise Monitor #3



Figure 33. Noise Monitor #3, 1-Hour L<sub>10</sub>, L<sub>50</sub>, L<sub>90</sub> L<sub>eq</sub> Sound Levels (July 6 - 7, 2021)



Figure 34. Noise Monitor #3, 1-Hour L<sub>10</sub>, L<sub>50</sub>, L<sub>90</sub> L<sub>eq</sub> Sound Levels (July 7 - 8, 2021)





Figure 35. Noise Monitor #3, 1/3 Octave Leq Sound Levels (July 6 - 8, 2021)



Noise Monitor #3



Figure 37. Noise Monitor #4, 15-Second Leg Sound Levels (July 30 - 31, 2021)







Figure 38. Noise Monitor #4, 1-Hour Leq Sound Levels (July 29 - 30, 2021)



Figure 39. Noise Monitor #4, 1-Hour Leq Sound Levels (July 30 - 31, 2021)





Figure 40. Noise Monitor #4, 1-Hour L<sub>10</sub>, L<sub>50</sub>, L<sub>90</sub> L<sub>eq</sub> Sound Levels (July 29 - 30, 2021)



Figure 41. Noise Monitor #4, 1-Hour L10, L50, L90 Leq Sound Levels (July 30 - 31, 2021)





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Figure 44. Noise Monitor #5, 15-Second Levels (July 7 - 8, 2021)





Figure 45. Noise Monitor #5, 1-Hour Leq Sound Levels (July 6 - 7, 2021)



Figure 46. Noise Monitor #5, 1-Hour Leq Sound Levels (July 7 - 8, 2021)



Noise Monitor #5



Figure 47. Noise Monitor #5, 1-Hour L<sub>10</sub>, L<sub>50</sub>, L<sub>90</sub> L<sub>eq</sub> Sound Levels (July 6 - 7, 2021)















Figure 51. Noise Monitor #6, 15-Second Leg Sound Levels (July 30 - 31, 2021)





Figure 52. Noise Monitor #6, 1-Hour Leq Sound Levels (July 29 - 30, 2021)



Figure 53. Noise Monitor #6, 1-Hour Leq Sound Levels (July 30 - 31, 2021)




Figure 54. Noise Monitor #6, 1-Hour L<sub>10</sub>, L<sub>50</sub>, L<sub>90</sub> L<sub>eq</sub> Sound Levels (July 29 - 30, 2021)



Figure 55. Noise Monitor #6, 1-Hour L10, L50, L90 Leq Sound Levels (July 30 - 31, 2021)





Figure 56. Noise Monitor #6, 1/3 Octave Leq Sound Levels (July 29 - 31, 2021)





Figure 58. Noise Monitor #8, 15-Second Levels (July 7 - 8, 2021)





Noise Monitor #8

Figure 59. Noise Monitor #8, 1-Hour Leq Sound Levels (July 6 - 7, 2021)



Figure 60. Noise Monitor #8, 1-Hour Leq Sound Levels (July 7 - 8, 2021)





Figure 61. Noise Monitor #8, 1-Hour L<sub>10</sub>, L<sub>50</sub>, L<sub>90</sub> L<sub>eq</sub> Sound Levels (July 6 - 7, 2021)



Figure 62. Noise Monitor #8, 1-Hour L<sub>10</sub>, L<sub>50</sub>, L<sub>90</sub> L<sub>eq</sub> Sound Levels (July 7 - 8, 2021)









Figure 65. Noise Monitor #9, 15-Second Levels (July 7 - 8, 2021)





Figure 66. Noise Monitor #9, 1-Hour Leq Sound Levels (July 6 - 7, 2021)



Figure 67. Noise Monitor #9, 1-Hour Leg Sound Levels (July 7 - 8, 2021)





Figure 68. Noise Monitor #9, 1-Hour L<sub>10</sub>, L<sub>50</sub>, L<sub>90</sub> L<sub>eq</sub> Sound Levels (July 6 - 7, 2021)



Figure 69. Noise Monitor #9, 1-Hour L<sub>10</sub>, L<sub>50</sub>, L<sub>90</sub> L<sub>eq</sub> Sound Levels (July 7 - 8, 2021)









Figure 72. Noise Monitor #10, 15-Second Leg Sound Levels (July 7 - 8, 2021)





Figure 73. Noise Monitor #10, 1-Hour Leq Sound Levels (July 6 - 7, 2021)



Figure 74. Noise Monitor #10, 1-Hour Leq Sound Levels (July 7 - 8, 2021)





Figure 75. Noise Monitor #10, 1-Hour L<sub>10</sub>, L<sub>50</sub>, L<sub>90</sub> L<sub>eq</sub> Sound Levels (July 6 - 7, 2021)



Figure 76. Noise Monitor #10, 1-Hour L<sub>10</sub>, L<sub>50</sub>, L<sub>90</sub> L<sub>eq</sub> Sound Levels (July 7 - 8, 2021)





Figure 77. Noise Monitor #10, 1/3 Octave Leg Sound Levels (July 6 - 8, 2021)





Figure 79. Noise Monitor #11, 15-Second Leg Sound Levels (July 7 - 8, 2021)





Figure 80. Noise Monitor #11, 1-Hour Leq Sound Levels (July 6 - 7, 2021)



Figure 81. Noise Monitor #11, 1-Hour Leq Sound Levels (July 7 - 8, 2021)





Figure 82. Noise Monitor #11, 1-Hour L10, L50, L90 Leq Sound Levels (July 6 - 7, 2021)



Figure 83. Noise Monitor #11, 1-Hour L<sub>10</sub>, L<sub>50</sub>, L<sub>90</sub> L<sub>eq</sub> Sound Levels (July 6 - 7, 2021)





Figure 84. Noise Monitor #11, 1/3 Octave Leg Sound Levels (July 6 - 8, 2021)





Figure 86. Noise Monitor #12, 15-Second Leg Sound Levels (July 7 - 8, 2021)









Figure 88. Noise Monitor #12, 1-Hour Leq Sound Levels (July 7 - 8, 2021)



Noise Monitor #12 - Period



Figure 89. Noise Monitor #12, 1-Hour L<sub>10</sub>, L<sub>50</sub>, L<sub>90</sub> L<sub>eq</sub> Sound Levels (July 6 - 7, 2021)



Figure 90. Noise Monitor #12, 1-Hour L10, L50, L90 Leq Sound Levels (July 7 - 8, 2021)



#12 - Period 1



Figure 91. Noise Monitor #12, 1/3 Octave Leg Sound Levels (July 6 - 8, 2021)







Figure 93. Noise Monitor #12, 15-Second Leg Sound Levels (July 30 - 31, 2021)





Figure 94. Noise Monitor #12, 1-Hour Leq Sound Levels (July 29 - 30, 2021)









Figure 96. Noise Monitor #12, 1-Hour L<sub>10</sub>, L<sub>50</sub>, L<sub>90</sub> L<sub>eq</sub> Sound Levels (July 29 - 30, 2021)



Figure 97. Noise Monitor #12, 1-Hour L<sub>10</sub>, L<sub>50</sub>, L<sub>90</sub> L<sub>eq</sub> Sound Levels (July 30 - 31, 2021)



-----Isolated Night 1

Isolated Night 2





Figure 98. Noise Monitor #12, 1/3 Octave Leg Sound Levels (July 29 - 31, 2021)



Figure 100. Noise Monitor #13, 15-Second Leq Sound Levels (July 7 - 8, 2021)









Figure 102. Noise Monitor #13, 1-Hour Leq Sound Levels (July 7 - 8, 2021)





Figure 103. Noise Monitor #13, 1-Hour L<sub>10</sub>, L<sub>50</sub>, L<sub>90</sub> L<sub>eq</sub> Sound Levels (July 6 - 7, 2021)



Figure 104. Noise Monitor #13, 1-Hour L<sub>10</sub>, L<sub>50</sub>, L<sub>90</sub> L<sub>eq</sub> Sound Levels (July 7 - 8, 2021)





Figure 105. Noise Monitor #13, 1/3 Octave Leg Sound Levels (July 6 - 8, 2021)

## Appendix I MEASUREMENT EQUIPMENT USED

## Brüel and Kjær 2250/2270

The environmental noise monitoring equipment used consisted of a Brüel and Kjær Type 2250/2270 Precision Integrating Sound Level Meter enclosed in an environmental case, a tripod, a weather protective microphone hood, and in certain cases, an external battery. The system acquired data in 15-second  $L_{eq}$ samples using 1/3 octave band frequency analysis and overall A-weighted and C-weighted sound levels. The sound level meter conforms to Type 1, ANSI S1.4, ANSI S1.43, IEC 61672-1, IEC 60651, IEC 60804 and DIN 45657. The 1/3 octave filters conform to S1.11 – Type 0-C, and IEC 61260 – Class 0. The calibrator conforms to IEC 942 and ANSI S1.40. The sound level meter, pre-amplifier and microphone were certified on May 19, 2021 / April 07, 2021 / April 07, 2021 / March 04, 2021 / March 04, 2021 / March 04, 2021 / April 07, 2021 / April 07, 2021 / April 07, 2021 / March 04, 2021 / March 04, 2021 / April 07, 2021 / August 01, 2019 / April 07, 2021 / April 07, 2021 and the calibrator (type B&K 4231) was certified on March 03, 2021 / by a NIST NVLAP Accredited Calibration Laboratory for all requirements of ISO 17025: 1999 and relevant requirements of ISO 9002:1994, ISO 9001:2000 and ANSI/NCSL Z540: 1994 Part 1. All measurement methods and instrumentation conform to the requirements of the AER Directive 038. Simultaneous digital audio was recorded directly on the sound level meter using a 8 kHz sample rate for more detailed post-processing analysis. Refer to the next section in the Appendix for a detailed description of the various acoustical descriptive terms used.

## Weather Monitor

The weather monitoring equipment used for the study consisted of an Orion Weather Station 9510-A-1 with a WXT520 Self-Aspirating Radiation Shield Sensor Unit, a Weather MicroServer 9590 Data-logger, and a Lightning Arrestor. The Data-logger and batteries were located in a grounded, weather protective case. The Sensor Unit was mounted on a sturdy survey tripod (with supporting guy-wires) at approximately 5.0 m above ground. The system was set up to record data in 1-minute samples obtaining the wind-speed, peak wind-speed, and wind-direction in a rolling 2-minute average as well as the 1-minute temperature, relative humidity, barometric pressure, rain rate and total rain accumulation.



Description	Date	Time	Pre / Post	Calibration Level	Calibrator Model	Serial Number	
Monitor #1	29-Jul-21	9:20	Pre	93.9 dBA	B&K 4231	2656414	
Monitor #1	31-Jul-21	9:30	Post	93.8 dBA	B&K 4231	2656414	
Monitor #2	06-Jul-21	10:45	Pre	93.9 dBA	B&K 4231	2656414	
Monitor #2	08-Jul-21	12:25	Post	93.8 dBA	B&K 4231	2656414	
Monitor #3	06-Jul-21	10:20	Pre	93.9 dBA	B&K 4231	2656414	
Monitor #3	08-Jul-21	12:40	Post	93.8 dBA	B&K 4231	2656414	
Monitor #4	29-Jul-21	7:30	Pre	93.9 dBA	B&K 4231	2656414	
Monitor #4	31-Jul-21	7:55	Post	93.8 dBA	B&K 4231	2656414	
Monitor #5	06-Jul-21	10:10	Pre	93.9 dBA	B&K 4231	2656414	
Monitor #5	08-Jul-21	12:55	Post	93.9 dBA	B&K 4231	2656414	
Monitor #6	29-Jul-21	8:00	Pre	93.9 dBA	B&K 4231	2656414	
Monitor #6	31-Jul-21	8:20	Post	93.9 dBA	B&K 4231	2656414	
Monitor #8	06-Jul-21	8:30	Pre	93.9 dBA	B&K 4231	2656414	
Monitor #8	08-Jul-21	14:15	Post	93.9 dBA	B&K 4231	2656414	
Monitor #9	06-Jul-21	7:30	Pre	93.9 dBA	B&K 4231	2656414	
Monitor #9	08-Jul-21	14:50	Post	93.8 dBA	B&K 4231	2656414	
Monitor #10	06-Jul-21	11:30	Pre	93.9 dBA	B&K 4231	2656414	
Monitor #10	08-Jul-21	11:55	Post	93.9 dBA	B&K 4231	2656414	
Monitor #11	06-Jul-21	8:00	Pre	93.9 dBA	B&K 4231	2656414	
Monitor #11	08-Jul-21	14:25	Post	93.8 dBA	B&K 4231	2656414	
Monitor #12 #1	06-Jul-21	9:35	Pre	93.9 dBA	B&K 4231	2656414	
Monitor #12 #1	08-Jul-21	13:20	Post	93.8 dBA	B&K 4231	2656414	
Monitor #12 #2	29-Jul-21	8:30	Pre	93.9 dBA	B&K 4231	2656414	
Monitor #12 #2	31-Jul-21	8:50	Post	93.8 dBA	B&K 4231	2656414	
Monitor #13	06-Jul-21	8:50	Pre	93.9 dBA	B&K 4231	2656414	
Monitor #13	08-Jul-21	14:00	Post	93.8 dBA	B&K 4231	2656414	

## **Record of Calibration Results**



	ACC R E D I T E D A C C R E D I T E D GLIBHATON LODATON			Specification	indicated by the presence of the Accrediting Body t.C, CLAS or ANAB do not guarantee the accuracy	reement requirements, ISO 90012015, ANSINCSL ANSINCSL Z540.3-2006 (R2013) are also	artificate. NPC), or other national measurement institutes andards or ratio type measurements. ired for further dissemination of traceability.	l or better (3:1 for mass calibrations), unless	ditions noted. The determination of compliance to warranted specifications or the client's requested operating instructions. This certificate may not	Customer Number: 9-330269-000 OPS-F20-014R8 04/01/21 FP001R9 4/9/2021
CERTIFICATE OF CALIBRATION	NSULTANTS INC 1 DAB	Certificate/SO Number: 17-Q1Y7V-20-1 Revision 0	As-Found: In Tolerance As-Left: In Tolerance Issue Date: May 19, 202 Calibration Date: May 19, 202	Calibrated To: Manufacture Calibration Procedure: 1-AC28548-5	I found in compliance with ISOIEC 17025.2017. Accredited calibrations performed within the Lab Scope of Accreditation are accredited calibration not covered by the Lab Scope of Accreditation are listed in the notes section of the certificate. SCC, NF	mpliance with the requirements of the Transcat Quality Manual QACP014000, the customer Purchase Order and/or Quality Ag e. When specified contractually, the requirements of ISO TS16949:2009, 10CFR21, 10CFR50 App. B, ASME NQA-1.2012, and	Transcat and are available for inspection. Laboratory standards used in the performance of this calibration are listed on this co to the SI units through the National Institute of Standards and Technology(NIST), or the National Research Council of Canada ( in Arrangement, or accepted fundamental and/or natural physical constants, or by the use of specified methods, consensus st itable for review upon written request at a Transcat facility. The measured quantity and the measurement uncertainty are requ	oviding a level of confidence of approximately 95%. All calibrations have been performed using processes having a TUR of 4: iculated in accordance with NCSL International RP-18. For mass calibrations: Conventional mass referenced to 8.0 g/cm <sup>2</sup> .	for tested. Recorded calibration data is valid at the time of calibration within the stated uncertainties at the environmental con referenced above based on the tolerances shown; these tolerances are either the original equipment manufacturers(OEM's) to drift out of tolerance at any time following its calibration. Limitations on the uses of this instrument are detailed in the OEM's of Transcat Additional information, if applicable may be included on separate report(s).	Certificate - Page 1 of 7
	Customer: ACI ACOUSTICAL CO 5031-210 STREET NN EDMONTON, AB T6N PO Number: BILAWCHUK-CC		Manufacturer: Bruel & Kjaer Model Number: 2250 Description: Sound Level Meter Serial Number: 2488495 ID: Unit #1		Transcat Calibration Laboratories have been audited an Logo and Certificate Number. Any measurements on at of an individual calibration by accredited laboratories.	Transcat calibrations, as applicable, are performed in cc Z540.1-1994 (R2002), and ISO 10012/2003, as applicab covered	Complete records of work performed are maintained by Transcat documents the traceability of measurements tr (NMI) that are signatories to the CIPPM Mutual Recogniti Documentation supporting traceability information is ava	Uncertainties are reported with a coverage factor k=2, p otherwise noted. The Test Uncertainty Ratio (TUR) is ca	The results in this report relate only to the item calibrate the specification is specific to the model/serial no./ID no. specifications. Any number of factors can cause a unit be reproduced except in full, without the written approva	Date Received: May 12, 2021 Service Level: R9

B&K 2250 Unit #1 SLM Calibration Certificate



CALIBI ISO 17025: 200 ACCREDITED by	RATION LABORATORY 5, ANSI/NCSL Z540: NVLAP (an ILAC MRA	1994 Part 1 signatory)		CALIBRATION				
Calib	ration C	ertific	cate N	o.46080				
Instrument: Ad Model: 42 Manufacturer: Br	coustical Calibrator 31 üel and Kiær	Date Calibrated: 3/3/2021 Cal Due: Status: <u>Received Sent</u>						
Serial number: 25 Class (IEC 60942): 1 Barometer type:	75493		Out of tolerand See comments Contains non-c	ce:	es X No			
Barometer s/n: Customer: Au Tel/Fax: 78	CI Acoustical Consulta 0-414-6373 / 780-41	ants Inc. 4-6376	Address: 5031 - 210 Street, Edmonton, Alberta, CANADA T6M 0A8					
Tested in accordance v Calibration of Acoust	vith the following pro ical Calibrators, Scant for calibration: Nor-1	ocedures and tek Inc., Rev.	d standards: 10/1/2010	522				
Instrument - Manufacture	Description	s/N	Cal. Date	Traceability evidence	Cal. Due			
483B-Norsonic	SME Cal Unit	31052	Oct 31, 2020	Scantek, Inc./ NVLAP	Oct 31, 2021			
DS-360-SRS	Function Generator	33584	Oct 23, 2019	ACR Env./ A2LA	Oct 23, 2021			
34401A-Agilent Technologies	Digital Voltmeter	MY4701111	8 Feb 4, 2021	ACR Env. / A2LA	Feb 4, 2022			
HM30-Thommen	Meteo Station	1040170/396	33 Dec 7, 2020	ACR Env./ A2LA	Dec 7, 2021			
PC Program 1018 Norsonic	Calibration software	1406423 v.6.1T	Validated Nov 2014	Scantek / NVLAP Scantek, Inc.	Nov 3, 2021			
4134-Brüel&Kjær	Microphone	173368	Oct 26, 2020	Scantek, Inc. / NVLAP	Oct 26, 2021			
1203-Norsonic	Preamplifier	14059	March 3, 2020	Scantek, Inc./ NVLAP	Inc./ NVLAP March 3, 2021			
Instrumentation and t maintained by NIST (U Calibrated by: Signature	est results are tracea SA) and NPL (UK) Lydon Dav	wkins/	ernational Syste Authorized sign Signature	em of Units) through atory: 1William D William D	standards Gallagher			
Calibration Certificates or Te This Calibration Certificate or or any agency of the federal Document stored as: Y:\C	st Reports shall not be rep r Test Reports shall not be government. alibration Lab\Cal 2021\BN	produced, except used to claim p IK4231_2575493	Date t in full, without wri roduct certification, 3_M1.doc	tten approval of the labora approval or endorsement	tory. by NVLAP, NIST, Page 1 of 2			



		A11(16).				ce of the Accrediting Body? o not guarantee the	ISO 90012015, this calibration are listed	aasurement institutes surements ion of traceability.	nce compliance e high calibration tolerance asurement result in the	librations), unless	ination of compliance to or the client?s requested	Number: 9-330269-000 104/01/21 FP014R0 4/2/2021	
TION		ANAB AC-2489.07	d: In Tolerance tt. In Tolerance	e: Apr 07, 2021 e: Apr 07, 2021	o: Manufacturer Specification e: 1-AC28548-3	e of Accreditation are indicated by the presenct the certificate, SCC, NRC, CLAS or ANAB do	rder and/or Quality Agreement requirements, locations standards used in the performance of	Council of Canada (NRC), or other national me hods, consensus standards or ratio type meas incertainty are required for further disseminati	ent?s Decision Rule. When Calibration Tolera ) as follows: ejection zones are defined as greater than th ance (OOT).	having a TUR of 4:1 or better (3:1 for mass ca ed to 8.0 g/cm <sup>2</sup> .	environmental conditions noted. The determi ifacturers(OEM?s) warranted specifications o n separate report(s).	Customer OPS-F20-014R8	
CERTIFICATE OF CALIBRAT	ONSULTANTS IN / 10A8	Certificate/SO Number: 17-Q1X3X-80-1 Revision (	As-Found As-Left	Issue Date: Calibration Date	Calibrated To Calibration Procedure:	f found in compliance with ISO/IEC 17025.2017. Accredited calibrations performed within the Lab's Scope in accredited calibration not covered by that Lab's Scope of Accreditation are listed in the notes section of tories.	npliance with the requirements of the Transcat Quality Manual QACP01.000, the customer/s Purchase Ord e. Complete records of work performed are maintained by Transcat and are available for inspection. Labor	the SI units through the National Institute of Standards and Technology(NIST), or the National Research Co Artrangement, or accepted fundamental and/or natural physical constants, or by the use of specified metho table for review upon written request at a Transcat facility. The measured quantity and the measurement un	mple rejection criteria is used for the determination of compliance, unless otherwise superseded by the clier g in the effects of uncertainty and comply with the guidelines established by ASME BB3.7.3.1-2001 (R2019), the high calibration tolerance limit, and/or greater than or equal to the low calibration tolerance limit. The rej be identified as intolerance. Single measurement results in the rejection zone are identified as out-ct-toleran te for repeated measurements, for the same characteristic, the test is identified as intolerance. For repeated to repeated measurements.	viding a level of confidence of approximately 95%. All calibrations have been performed using processes he sulated in accordance with NCSL international RP-18. For mass calibrations: Conventional mass referenced	or tested. Recorded calibration data is valid at the time of calibration within the stated uncertainties at the e efferenced above based on the tolerances shown; these tolerances are either the original equipment manufice pot in full, without the written approval of Transcat. Additional information, if applicable may be included on	Certificate - Page 1 of 7	-
	Customer: ACI ACCOUSTICAL C 5031-210 STREET NV EDMONTON, AB T6M	FO NUMBER: BILAWCHUK	Manufacturer: Bruel & Kjaer Model Number: 2270 Description: Sound Level Meter	Serial Number: 3002730/2850741 ID: UNIT 3		Transcat Calibration Laboratories have been audited an s Logo and Certificate Number. Any measurements on accuracy of an individual calibration by accredited labora	Transcat calibrations, as applicable, are performed in co ANSI/NCSL 2540;1-1994 (R2002) or NOA-1, as applicab on this certificate.	Transcat documents the traceability of measurements to (NMI) that are signatories to the CIPM Mutual Recognitio Documentation supporting traceability information is avai	A binary decision rule, utilizing simple acceptance, and s statements are present, they are reported without factori -The acceptance zone is defined as liess than or equal tti limit and/or less than the low calibration tolerance limit. Single measurement results in the acceptance zone are -When all measurement results are in the acceptance zone rejection zone, will cause the test to be identified as out-or	Uncertainties are reported with a coverage factor k=2, pn otherwise noted. The Test Uncertainty Ratio (TUR) is call	The results in this report relate only to the item calibrated the specification is specific to the model/serial no.//D no. I specifications. This certificate may not be reproduced ex	Date Received: March 19, 2021 Service Level : R9	

B&K 2270 Unit #3 SLM Calibration Certificates








#### B&K 2270 Unit #4 Microphone Calibration Certificate



B&K 2250 Unit #5 SLM Calibration Certificate

ISO 1702 ACCREDI	CALIBRA 5: 2005, TED by N	ATION LA , ANSI/N IVLAP (an	BORATORY ICSL Z540:1 ILAC MRA	1994 Part 1 signatory)			LLIBRATION b Code: 20062	\$ 25-0
Ca	alib	ratio	on C	ertifi	cate N	10.4	6081	
Instrument:	Sound	Level M	eter		Date Calibrat	ed:3/4/	2021 Cal Du	ie:
Model:	2250				Status:		Received	Sent
Manufacturer:	Brüel a	and Kjær			In tolerance:		X	X
Serial number:	27228	94		Contraction of the	Out of tolera	nce: _	1	
lested with:	Micro	phone 4	189 s/n 271	1977	See commen	ts:		
	Pream	pinner Z	C0032 s/n 1	13895	Contains non	-accredit	red tests:Ye	es X No
Customer	ACLAC	oustical	Consultante	Inc	Address:	031 21	Basic X Sta	andard
T. US		oustical		o mic.	Address. 5	lberta (	CANADA TEM	
Tel/Fax:	780-41	14-6373 /	780-414-63	376		aberta, t	ANADA TON	UAB
Instrument - Manut	facturer	Des	cription	s/N	Cal. Date	Traceal Cal. Lab	bility evidence / Accreditation	Cal. Due
483B-Norsonic	6-20	SME	Cal Unit	31052	Oct 31, 2020	Scante	k, Inc./ NVLAP	Oct 31, 2021
DS-360-SRS	a a farada a	Function	n Generator	33584	Oct 23, 2019	ACR	Env./ A2LA	Oct 23, 2021
HM30-Thommen	nologies	Digital	Voltmeter	MY4/01111	8 Feb 4, 2021	ACR	Env. / A2LA	Feb 4, 2022
	. 1	wiete	o station	1040170/390	Validated Nov	ACK	Env./ AZLA	Dec 7, 2021
PC Program 1019 No	rsonic	Calibrati	ion software	v.6.1T	2014	Sca	antek, Inc.	
1251-Norsonic	X	Cal	librator	30878	Oct 26, 2020	Scante	k, Inc./ NVLAP	Oct 26, 2021
Environmental Tempera	condition ature (°C)	A) and N ns: )	Baron	netric pressu 99.52	ire (kPa)	em of Ur Re	elative Humidi 44.9	ty (%)
X					Lengy	12.00		176
Calibrate	d by:	1	Lydon Daw	kins /	Authorized sign	atory:	William D.	Gallagher
Signatu	ure	Augol	on Day	Rins	Signature		Willer	gully
Date		3	14/202	21	Date	-	3/5/2	2021
Calibration Certifica This Calibration Cer or any agency of the Document stored	ites or Test tificate or 1 e federal ge Y:\Calibra	Reports sh Test Report overnment. ation Lab\SL	all not be repr s shall not be u .M 2021\BNK2	oduced, except used to claim pr 250_2722894_	in full, without wri oduct certification, M1.doc	tten appro approval o	val of the laborat or endorsement b	ory. vy NVLAP, NIST, Page 1 of 2









**B&K 2250 Unit #6 SLM Calibration Certificate** 









	ACCARONAL AND AC		pecification indicated by the presence of the Accrediting Body?	NKC, CLAS or ANAB do not guarantee the eement requirements, ISO 90012015, I in the performance of this calibration are listed	C), or other national measurement institutes lards or ratio type measurements. If for further dissemination of traceability. When Calibration Tolerance compliance fined as greater than the high calibration tolerance surements, a single measurement result in the	better (3:1 for mass calibrations), unless ons noted. The determination of compliance to rranted specifications or the client7s requested	Customer Number: 9-330269-000 OPS-F20-014R8 04/01/21 FP014R0 4/2/2021
CERTIFICATE OF CALIBRATION	onsultants IN v 1048 Certificate/SO Number: 17-Q1X3X-20-1 Revision 0	As-Found: In Tolerance As-Left: In Tolerance Issue Date: Apr 07, 2021 Calibration Date: Apr 07, 2021	Calibrated To: Manufacturer S Calibration Procedure: 1-AC28548-3 d found in compliance with ISO/EC 17025:2017. Accredited calibrations performed within the Lab's Scope of Accreditation are	an acception of the non-provided by that Lab /s scope of Accretization are listed in the holds section of the certificate. SUC, patients. atoms. Applicate with the requirements of the Transcat Quality Manual QAC-P01-000, the customer?s Purchase Order and/or Quality Agree. Complete records of work performed are maintained by Transcat and are available for inspection. Laboratory standards used	b the SI units through the National Institute of Standards and Technology(NIST), or the National Research Council of Carnada (NR Arangament, or accepted fundamental and/or natural physical constants, or by the use of specified methods, consensus stantilable for review upon written request at a Transcat facility. The measured quantity and the measurement uncertainty are require imple rejection criteria is used for the determination of compliance, unless otherwise supersaded by the client's Decision Rule V ng in the effects of uncertainty and comply with the guidelines established by ASME BB9.7.3.1-2001 (R2019) as follows: or the high calibration tolerance imit, and/or greater than or equal to the low ealibration tolerance imit. The rejection zones are de the information of carnet in the rejection zone are determined for greater than or equal to the low ealibration tolerance imit. The rejection zones are de the information to the resurrement transity in the reflection zone are determined for greater than or equal to the low ealibration tolerance limit, and/or greater than or equal to the low ealibration tolerance limit. The rejection zones are determined for the advective core. Single measurement results in the rejection zone are identified as intolerance. Single measurement results in the reston zone are identified as intolerance. For the same characteristic, the test is identified as intolerance. For repeated characteristic measurement. Accord measurements.	volding a level of confidence of approximately 95%. All calibrations have been performed using processes having a TUR of 4:1 or culated in accordance with NCSL international RP-18. For mass calibrations: Conventional mass referenced to 8.0 g/cm <sup>3</sup> , or tested. Recorded calibration data is valid at the time of calibration within the stated uncertainties at the environmental condition referenced above based on the tolerarices shown; these tolerances are either the original equipment manufacturers(CEM7s) we conditioned the uncertainties at the time of calibration information, if applicable may be included on separate report(s).	Certificate - Page 1 of 7
	Customer: ACI ACCOUSTICAL ( 5031-210 STREET N' EDMONTON, AB T6I PO Number: BILAWCHUK	Manufacturer: Bruel & Kjaer Model Number: 2250 Description: Sound Level Meter Serial Number: 2722859/2710791 ID: UNIT #7	Transcat Calibration Laboratories have been audited a	s cuego and centimeter vulnes: Any measurements or accuracy of an individual calibration by accredited labo Transcat calibrations, as applicable, are performed in c ANSINCSI. Z540.1-1994 (R2002) or NOA-1, as applica on this certificate.	Transcat documents the traceability of measurements (NM) that are signatories to the CIPM Mutual Recognit Documentation supporting traceability information is av A binary decision rule, utilizing simple acceptance, and statements are present, they are reported without facto The acceptance zone is defined as: than or equal Timit and/or less than the low calibration tolerance imit. Single measurement results in the acceptance zone ar volven all measurement results in the acceptance zone ar relection zone will cruse the text the net demind as:	Uncertainties are reported with a coverage factor k=2, F otherwise noted. The Test Uncertainty Ratio (TUR) is c the results in this report relate only to the item calibrate the specification is specific to the model'serial no /ID no specifications. This certificate may not be reproduced e	Date Received: March 19, 2021 Service Level: R9

B&K 2250 Unit #7 SLM and Mic Calibration Certificate

# aci acoustical consultants inc

B&K 2250 Unit #8 SLM Calibration Certificate



## MANUFACTURER'S CERTIFICATE OF CONFORMANCE

We certify that Brüel & Kjær **-2250--W00-** Serial No. **3028218** has been tested and passed all production tests, confirming compliance with the manufacturer's published specification at the date of the test.

The final test has been performed using calibrated equipment, traceable to national or international standards or by ratio measurements.

Brüel & Kjær is certified under ISO 9001 assuring that all test data is retained on file and is available for inspection upon request.

Nærum 23-aug-2019

Torben Bjørn Vice President, Operations

Please note that this document is not a calibration certificate. For information on our calibration services please go to www.bksv.com/service.



#### **B&K 2250 Unit #8 Microphone Calibration Certificate**

North Americ	ca Inc.							
TI	ne Bruel and Kjaer Cal 3079 Premiere Park Duluth, GA Telephone: 770 Fax: 770-44 Web site address: http	libration Laboratory cway Suite 120 . 30097 )-209-6907 17-4033 ://www.bksv.com			ACCRED	Calib Certi TED # 150	ration ficate 58.01	
CERTIFIC	ATE OF CAL	IBRATION	No.: CA	S-398151	-T0G1R0-4	401	Page 1 of 4	
CALIBRAT	TION OF:							
Microphone:	Brüel & Kjær	Ту	pe 4189		Serial No.	2851039	Р.,	
CUSTOME	ACI 503 Edm	Acoustical Consulta 1-210 Street nonton, AB T6M 0A	nts Inc. 8					
CALIBRAT	TION CONDI	TIONS:						
Environment cor	nditions:	Air temperature:	23	3.6 °C				
		Air pressure:	98.1	49 kPa				
Applied polariza SPECIFIC/ This document c acceptance criter within specified using a test syster received" and "ff	ATIONS: ATIONS: tertifies that the instria as prescribed by criteria with no reducent which conforms inal" data, see the at	Air pressure: Relative Humidity: 0 Vdc rument as listed under the referenced Procedu uction by the uncertain to the requirements of ttached page(s). Items r	98.1 50 "Type" has bee re. Statements ty of the measu ISO/IEC 1702 narked with or	49 kPa ).3 %RH en calibrated a of compliance urements. The 5, ANSI/NCS he asterisk (*)	nd unless othe e, where applic calibration of L Z540-1, and are not covere	rwise indicat cable, are bas the listed tran guidelines of d by the scop	ed under "Final D ed on calibration isducer was accor FISO 10012-1. Fo e of the current A	Data", med results fa mplished or "as 12LA
Applied polariza SPECIFIC/ This document c acceptance criter within specified using a test syste received" and "ff accreditation. Th Calibration Labo values traceable constants.	ATIONS: ATIONS: ertifies that the inst ria as prescribed by criteria with no redu- m which conforms inal" data, see the at nis Certificate and at roratory-Duluth, GA. to the National Inst	Air pressure: Relative Humidity: 0 Vdc rument as listed under ' the referenced Procedu uction by the uncertain to the requirements of ttached page(s). Items r ttached data pages shal . Results relate only to i itute of Standards and '	98.1 50 "Type" has bee re. Statements ty of the measu ISO/IEC 1702 narked with or I not be reprod the items tester feehnology, N	49 kPa ).3 %RH en calibrated a of compliance urements. The 5. ANSI/NCS: the asterisk (*) uced, except i uced, except i d. The transdu ational Measu	nd unless othe e, where applic calibration of L Z540-1, and are not covere are not covere n full, without cer has been c rement Institu	rwise indicat cable, are bas the listed tran guidelines of d by the scop written appre- alibrated usin tes or derived	ed under "Final D ed on calibration isducer was acco FISO 10012-1. Fo e of the current A oval of the Bruel i ig Measurement S I from natural phy	Data", mec results fa mplished or "as v2LA and Kjaer standards /sical
Applied polariza SPECIFIC/ This document c acceptance criter within specified using a test syster received" and "f accreditation. Th Calibration Labo values traceable constants. PROCEDU The measurement B&K 9721 with	ation voltage: ATIONS: certifies that the inst- ria as prescribed by criteria with no red em which conforms inal" data, see the at oratory-Duluth, GA. to the National Inst RE: nts have been perfor application softwar	Air pressure: Relative Humidity: 0 Vde rument as listed under ' the referenced Procedu uction by the uncertain to the requirements of ttached page(s). Items r ttached data pages shal . Results relate only to i itute of Standards and ' rmed with the assistance the WT9649 and WT965	98.1 50 "Type" has bee re. Statements ISO/IEC 1702 narked with or I not be reprod the items tester (rechnology, N e of Brüel & K 0 version 5.2 u	49 kPa ),3 %RH en calibrated a of compliance arements. The 5, ANSI/NCS he asterisk (*) uced, except i d. The transdu ational Measu (jaer Micropho using calibratic	nd unless othe e, where applic calibration of L Z540-1, and are not covere n full, without cer has been c rement Institu one Calibration on procedure:	rwise indicat cable, are bas the listed tran guidelines of d by the scop written appro- alibrated usin tes or derived System 4189-S251-I	ed under "Final D ed on calibration isducer was accor FISO 10012-1. Fo e of the current A oval of the Bruel a g Measurement S from natural phy F-01	Data", mec results fa mplished or "as v2LA and Kjaer Standards /sical
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Applied polariza SPECIFIC/ This document c acceptance criter within specified using a test syster received" and "fi cacreditation. Th Calibration Labor values traceable constants. PROCEDU The measurement B&K 9721 with RESULTS: X "As F	ATIONS: ATIONS: wertifies that the instria as prescribed by criteria with no redu m which conforms inal" data, see the at nis Certificate and at oratory-Duluth, GA. to the National Inst <b>RE:</b> nts have been perfor application softwar Received" Data: With	Air pressure: Relative Humidity: 0 Vdc rument as listed under the referenced Procedu uction by the uncertain to the requirements of ttached page(s). Items r ttached data pages shal . Results relate only to 1 itute of Standards and ' rmed with the assistance the WT9649 and WT965	98.1 50 "Type" has bee re. Statements y of the measu ISO/IEC 1702 narked with or I not be reprod the items tester ("echnology, N e of Brüel & K 0 version 5.2 to a	49 kPa ).3 %RH en calibrated a of compliance arements. The 5. ANSI/NCS ne asterisk (*) uced, except i d. The transdu ational Measu (jær Micropho using calibratic "As Receive "Einal" Dete	nd unless othe e, where applid calibration of L Z540-1, and are not covere n full, without cer has been c rement Institu one Calibration on procedure: d" Data: Outsi	rwise indicat cable, are bas the listed tran guidelines of d by the scop written appra alibrated usin tes or derived System 4189-S251-I de Acceptanc	ed under "Final D ed on calibration isducer was accor FISO 10012-1. Fo e of the current A oval of the Bruel i g Measurement S if from natural phy FF-01	Data", mee results fa mplished or "as \2LA and Kjaet Standards /sical
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<b><i>IIFICATE OF CALIBRATION</i></b>		ertificate/SO Number: 17-Q1X3X-40-1 Revision 0	As-Found: In Tolerance As-Left: In Tolerance Issue Date: Apr 07, 2021 Calibration Date: Apr 07, 2021	Calibrated To: Manufacturer Spe	Calibration Procedure: 1-AC28548-3 with ISO/IEC 17025.2017. Accredited calibrations performed within the Lab?s Scope of Accreditation are indic	on not covered by that Lab7s Scope of Accreditation are listed in the notes section of the certificate. SCC, NRC uirements of the Transcat Quality Manual QACP01.000, the customer's Purchase Order and/or Quality Agreen of work performed are maintained by Transcat and are available for inspection. Laboratory standards used in	he National Institute of Standards and Technology(NIST), or the National Research Council of Canada (NRC), cepted fundamental and/or natural physical constants, or by the use of specified methods, consensus standard written request at a Transcat facility. The measured quantity and the measurement uncertainty are required for	I is used for the determination of compliance, unless otherwise superseded by the client's Decision Rule. When certainty and comply with the guidelines established by ASME B88.7.3.1-2001 (R2019) as follows: olerance limit, and/or greater than or equal to the low calibration tolerance limit. The rejection zones are defined refance. Single measurement results in the rejection zone are identified as out-of-tolerance (OOT). urements, for the same characteristic, the test is identified as intolerance. For repeated characteristic measure	idence of approximately 95%. All calibrations have been performed using processes having a TUR of4:1 or bet with NCSL International RP-18. For mass calibrations: Conventional mass referenced to 8.0 g/cm².	calibration data is valid at the time of calibration within the stated uncertainties at the environmental conditions ed on the tolerances shown; these tolerances are either the original equipment manufacturers(OEM*s) warran s written approval of Transcat Additional information, if applicable may be included on separate report(s).	Certificate - Page 1 of 7
CALIBRATED CER	Customer: ACI ACCOUSTICAL CONSULTANTS I 5031-210 STREET NW EDMONTON, AB T6M 0A8 PO Number: BILAWCHUK	ŏ	Manufacturer: Bruel & Kjaer Model Number: 2250 Description: Sound Level Meter Serial Number: 3027810/3195885 ID: UNIT 9		Transcat Calibration Laboratories have been audited and found in compliance	s Logo and Certificate Number. Any measurements on an accredited calibral accuracy of an individual calibration by accredited laboratories. Transcat calibrations, as applicable, are performed in compliance with the res ANSINCSL 2540.1-1994 (R2002) or NQA-1, as applicable. Complete records on this certificate.	Transcat documents the traceability of measurements to the SI units through (NMI) that are signatories to the CIPM Mutual Recognition Arrangement, or are Documentation supporting traceability information is available for review upon	A binary decision rule, utilizing simple acceptance, and simple rejection criteri statements are present, they are reported without factoring in the effects of ur -The acceptance zone is defined as less than or equal to the high calibration limit and/or less than the low calibration tolerance limit. -Single measurement results in the acceptance zone for repeated meas u/When all measurement results are in the acceptance zone for repeated meas rejection zone, will cause the test to be identified as out-of-tolerance (OOT).	Uncertainties are reported with a coverage factor k=2, providing a level of con otherwise noted. The Test Uncertainty Ratio (TUR) is calculated in accordance	The results in this report relate only to the item calibrated or tested. Recorded the specification is specific to the model/serial no //D no. referenced above bar specifications. This certificate may not be reproduced except in full, without th	Date Received: March 19, 2021 Service Level : R9

B&K 2250 Unit #9 SLM Calibration Certificate

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	CERTIFICATE OF CALIBRATION	
Customer: ACI ACCOUSTICAL CO 5031-210 STREET NW EDMONTON, AB T6M	INSULTANTS IN ANABE DAS	11111
PO Number: BILAWCHUK	ANAB AC-2489.07	
	Certificate/SO Number: 17-Q1X3X-60-1 Revision 0	
Manufacturer: Bruel & Kjaer	As-Found: In Tolerance	
Model Number: 2250	As-Left: In Tolerance	
Coriol Mumber: 2007512000000		
Jerial Mulliper: 300/34/28/0004	Issue Date: Apr 07, 2021 Calibration Date: Apr 07, 2021	
	Calibrated To: Manufacturer Specification	
	Calibration Procedure: 1-AC28548-3	
Transcat Calibration Laboratories have been audited and s Logo and Certificate Number. Any measurements on an accuracy of an individual calibration by accredited laborate	found in compliance with ISO/IEC 17025:2017. Accredited calibrations performed within the Lab?s Scope of Accreditation are indicated by the presence of the Accrediting Body? accredited calibration not covered by that Lab?s Scope of Accreditation are listed in the notes section of the certificate. SCC, NRC, CLAS or ANAB do not guarantee the ories.	
Transcat calibrations, as applicable, are performed in com ANSI/NCSL 25401-1994 (R2002) or NQA-1, as applicable on this certificate.	pliance with the requirements of the Transcat Quality Manual QAC-P04.000, the customer/s Purchase Order and/or Quality Agreement requirements, ISO 9001.2015, . Complete records of work performed are maintained by Transcat and are available for inspection. Laboratory standards used in the performance of this calibration are listed	
Transcat documents the traceability of measurements to 1 (NMI) that are signatories to the CIPM Mutual Recognition (NMI) that are signatories to the CIPM information is availa Documentation supporting traceability information is availa	he SI units through the National Institute of Standards and Technology(NIST), or the National Research Council of Canada (NRC), or other national measurement institutes Arrangement, or accepted fundamental and/or natural physical constants, or by the use of specified methods, consensus standards or ratio type measurements able for review upon written request at a Transcat facility. The measured quantity and the measurement uncertainty are required for further dissemination of traceability.	
A binary decision rule, utilizing simple acceptance, and sin statements are present, they are reported without factoring. -The acceptance zone is defined as: less than or equal to limit and/or less than the low calibration tolerance limit. -Single measurement results are in the acceptance zone are b When all measurement results are in the acceptance zone rejection zone, will cause the test to be identified as out-of-	ple rejection criteria is used for the determination of compliance, unless otherwise superseded by the client/S Decision Rule. When Calibration Tolerance compliance in the effects of uncertainty and comply with the guidelines established by ASME B99.7.3.1-5001 (R2019) as follows: the high calibration tolerance limit, and/or greater than or equal to the low calibration tolerance limit. The rejection zones are defined as greater than the high calibration tolerance e identified as intolerance. Single measurement results in the rejection zone are identified as out-of-tolerance (DOT). The repeated measurements, for the same characteristic, the test is identified as out-of-tolerance (DOT).	
Uncertainties are reported with a coverage factor k=2, prov otherwise noted. The Test Uncertainty Ratio (TUR) is calc.	iding a level of confidence of approximately 95%. All calibrations have been performed using processes having a TUR of 4:1 or better (3:1 for mass calibrations), unless ulated in accordance with NCSL International RP-18. For mass calibrations: Conventional mass referenced to 8.0 g/cm <sup>2</sup> .	
The results in this report relate only to the item calibrated the specification is specific to the mode/serial no/ID no. respecifications. This certificate may not be reproduced exci	r tested. Recorded calibration data is valid at the time of calibration within the stated uncertainties at the environmental conditions noted. The determination of compliance to ferenced above based on the tolerances shown; these tolerances are either the original equipment manufacturers(OEM7s) warranted specifications or the client?s requested spt in full, without the written approval of Transcat Additional information, if applicable may be included on separate report(s).	
Date Received: March 19, 2021 Service Level: R9	Certificate - Page 1 of 7 Certificate - Page 1 of 7 Certificate - Page 1 of 7	000
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B&K 2250 Unit #10 SLM Calibration Certificate

#### Appendix II THE ASSESSMENT OF ENVIRONMENTAL NOISE (GENERAL)

#### Sound Pressure Level

Sound pressure is initially measured in Pascal's (Pa). Humans can hear several orders of magnitude in sound pressure levels, so a more convenient scale is used. This scale is known as the decibel (dB) scale, named after Alexander Graham Bell (telephone guy). It is a base 10 logarithmic scale. When we measure pressure we typically measure the RMS sound pressure.

$$SPL = 10\log_{10}\left[\frac{P_{RMS}^{2}}{P_{ref}^{2}}\right] = 20\log_{10}\left[\frac{P_{RMS}}{P_{ref}}\right]$$

Where:

SPL = Sound Pressure Level in dB  $P_{RMS} =$  Root Mean Square measured pressure (Pa)  $P_{ref} =$  Reference sound pressure level ( $P_{ref} = 2x10^{-5}$  Pa = 20 µPa)

This reference sound pressure level is an internationally agreed upon value. It represents the threshold of human hearing for "typical" people based on numerous testing. It is possible to have a threshold which is lower than 20  $\mu$ Pa which will result in negative dB levels. As such, zero dB does not mean there is no sound!

In general, a difference of 1 - 2 dB is the threshold for humans to notice that there has been a change in sound level. A difference of 3 dB (factor of 2 in acoustical energy) is perceptible and a change of 5 dB is strongly perceptible. A change of 10 dB is typically considered a factor of 2. This is quite remarkable when considering that 10 dB is 10-times the acoustical energy!







#### **Frequency**

The range of frequencies audible to the human ear ranges from approximately 20 Hz to 20 kHz. Within this range, the human ear does not hear equally at all frequencies. It is not very sensitive to low frequency sounds, is very sensitive to mid frequency sounds and is slightly less sensitive to high frequency sounds. Due to the large frequency range of human hearing, the entire spectrum is often divided into 31 bands, each known as a 1/3 octave band.

The internationally agreed upon center frequencies and upper and lower band limits for the 1/1 (whole octave) and 1/3 octave bands are as follows:

	Whole Octave				1/3 Octave	
Lower Band	Center	Upper Band		Lower Band	Center	Upper Band
Limit	Frequency	Limit	_	Limit	Frequency	Limit
11	16	22		14.1	16	17.8
				17.8	20	22.4
				22.4	25	28.2
22	31.5	44		28.2	31.5	35.5
				35.5	40	44.7
				44.7	50	56.2
44	63	88		56.2	63	70.8
				70.8	80	89.1
				89.1	100	112
88	125	177		112	125	141
				141	160	178
				178	200	224
177	250	355		224	250	282
				282	315	355
				355	400	447
355	500	710		447	500	562
				562	630	708
				708	800	891
710	1000	1420		891	1000	1122
				1122	1250	1413
				1413	1600	1778
1420	2000	2840		1778	2000	2239
				2239	2500	2818
				2818	3150	3548
2840	4000	5680		3548	4000	4467
				4467	5000	5623
				5623	6300	7079
5680	8000	11360		7079	8000	8913
				8913	10000	11220
				11220	12500	14130
11360	16000	22720		14130	16000	17780
				17780	20000	22390



Human hearing is most sensitive at approximately 3500 Hz which corresponds to the <sup>1</sup>/<sub>4</sub> wavelength of the ear canal (approximately 2.5 cm). Because of this range of sensitivity to various frequencies, we typically apply various weighting networks to the broadband measured sound to more appropriately account for the way humans hear. By default, the most common weighting network used is the so-called "A-weighting". It can be seen in the figure that the low frequency sounds are reduced significantly with the A-weighting.



#### **Combination of Sounds**

When combining multiple sound sources the general equation is:

$$\Sigma SPL_n = 10\log_{10}\left[\sum_{i=1}^n 10^{\frac{SPL_i}{10}}\right]$$

Examples:

- Two sources of 50 dB each add together to result in 53 dB.
- Three sources of 50 dB each add together to result in 55 dB.
- Ten sources of 50 dB each add together to result in 60 dB.
- One source of 50 dB added to another source of 40 dB results in 50.4 dB

It can be seen that, if multiple similar sources exist, removing or reducing only one source will have little effect.



#### Sound Level Measurements

Over the years a number of methods for measuring and describing environmental noise have been developed. The most widely used and accepted is the concept of the Energy Equivalent Sound Level ( $L_{eq}$ ) which was developed in the US (1970's) to characterize noise levels near US Air-force bases. This is the level of a steady state sound which, for a given period of time, would contain the same energy as the time varying sound. The concept is that the same amount of annoyance occurs from a sound having a high level for a short period of time as from a sound at a lower level for a longer period of time. The  $L_{eq}$  is defined as:

$$L_{eq} = 10\log_{10}\left[\frac{1}{T}\int_{0}^{T}10^{\frac{dB}{10}}dT\right] = 10\log_{10}\left[\frac{1}{T}\int_{0}^{T}\frac{P^{2}}{P_{ref}^{2}}dT\right]$$

We must specify the time period over which to measure the sound. i.e. 1-second, 10-seconds, 15-seconds, 1-minute, 1-day, etc. An  $L_{eq}$  is meaningless if there is no time period associated.

In general there a few very common  $L_{eq}$  sample durations which are used in describing environmental noise measurements. These include:

- L<sub>eq</sub>24 Measured over a 24-hour period
- $L_{eq}Night$  Measured over the night-time (typically 22:00 07:00)
- $L_{eq}Day$  Measured over the day-time (typically 07:00 22:00)
- $L_{DN}$  Same as  $L_{eq}24$  with a 10 dB penalty added to the night-time



#### **Statistical Descriptor**

Another method of conveying long term noise levels utilizes statistical descriptors. These are calculated from a cumulative distribution of the sound levels over the entire measurement duration and then determining the sound level at xx % of the time.



Industrial Noise Control, Lewis Bell, Marcel Dekker, Inc. 1994

The most common statistical descriptors are:

L <sub>min</sub>	- minimum sound level measured
L <sub>01</sub>	- sound level that was exceeded only 1% of the time
L <sub>10</sub>	- sound level that was exceeded only 10% of the time.
	- Good measure of intermittent or intrusive noise
	- Good measure of Traffic Noise
L50	- sound level that was exceeded 50% of the time (arithmetic average)
	- Good to compare to Leq to determine steadiness of noise
L90	- sound level that was exceeded 90% of the time
	- Good indicator of typical "ambient" noise levels
L99	- sound level that was exceeded 99% of the time
L <sub>max</sub>	- maximum sound level measured

These descriptors can be used to provide a more detailed analysis of the varying noise climate:

- If there is a large difference between the  $L_{eq}$  and the  $L_{50}$  ( $L_{eq}$  can never be any lower than the  $L_{50}$ ) then
- it can be surmised that one or more short duration, high level sound(s) occurred during the time period. - If the gap between the  $L_{10}$  and  $L_{90}$  is relatively small (less than 15 - 20 dBA) then it can be surmised

that the noise climate was relatively steady.



#### Sound Propagation

In order to understand sound propagation, the nature of the source must first be discussed. In general, there are three types of sources. These are known as 'point', 'line', and 'area'. This discussion will concentrate on point and line sources since area sources are much more complex and can usually be approximated by point sources at large distances.

#### Point Source

As sound radiates from a point source, it dissipates through geometric spreading. The basic relationship between the sound levels at two distances from a point source is:

$$\therefore SPL_1 - SPL_2 = 20\log_{10}\left(\frac{r_2}{r_1}\right)$$

Where:

:  $SPL_1 = sound pressure level at location 1, SPL_2 = sound pressure level at location 2$  $r_1 = distance from source to location 1, r_2 = distance from source to location 2$ 

Thus, the reduction in sound pressure level for a point source radiating in a free field is **6 dB per doubling of distance**. This relationship is independent of reflectivity factors provided they are always present. Note that this only considers geometric spreading and does not take into account atmospheric effects. Point sources still have some physical dimension associated with them, and typically do not radiate sound equally in all directions in all frequencies. The directionality of a source is also highly dependent on frequency. As frequency increases, directionality increases.

Examples (note no atmospheric absorption):

- A point source measuring 50 dB at 100m will be 44 dB at 200m.
- A point source measuring 50 dB at 100m will be 40.5 dB at 300m.
- A point source measuring 50 dB at 100m will be 38 dB at 400m.
- A point source measuring 50 dB at 100m will be 30 dB at 1000m.

### Line Source

A line source is similar to a point source in that it dissipates through geometric spreading. The difference is that a line source is equivalent to a long line of many point sources. The basic relationship between the sound levels at two distances from a line source is:

$$SPL_1 - SPL_2 = 10 \log_{10} \left( \frac{r_2}{r_1} \right)$$

The difference from the point source is that the '20' term in front of the 'log' is now only 10. Thus, the reduction in sound pressure level for a line source radiating in a free field is **3 dB per doubling of distance**.

Examples (note no atmospheric absorption):

- A line source measuring 50 dB at 100m will be 47 dB at 200m.
- A line source measuring 50 dB at 100m will be 45 dB at 300m.
- A line source measuring 50 dB at 100m will be 44 dB at 400m.
- A line source measuring 50 dB at 100m will be 40 dB at 1000m.



#### Atmospheric Absorption

As sound transmits through a medium, there is an attenuation (or dissipation of acoustic energy) which can be attributed to three mechanisms:

- 1) **Viscous Effects** Dissipation of acoustic energy due to fluid friction which results in thermodynamically irreversible propagation of sound.
- 2) **Heat Conduction Effects** Heat transfer between high and low temperature regions in the wave which result in non-adiabatic propagation of the sound.
- 3) **Inter Molecular Energy Interchanges** Molecular energy relaxation effects which result in a time lag between changes in translational kinetic energy and the energy associated with rotation and vibration of the molecules.

The following table illustrates the attenuation coefficient of sound at standard pressure (101.325 kPa) in units of dB/100m.

Temperature	Relative Humidity		I	Frequen	cy (Hz)	I	
٥C	(%)	125	250	500	1000	2000	4000
	20	0.06	0.18	0.37	0.64	1.40	4.40
30	50	0.03	0.10	0.33	0.75	1.30	2.50
	90	0.02	0.06	0.24	0.70	1.50	2.60
	20	0.07	0.15	0.27	0.62	1.90	6.70
20	50	0.04	0.12	0.28	0.50	1.00	2.80
	90	0.02	0.08	0.26	0.56	0.99	2.10
	20	0.06	0.11	0.29	0.94	3.20	9.00
10	50	0.04	0.11	0.20	0.41	1.20	4.20
	90	0.03	0.10	0.21	0.38	0.81	2.50
0	20	0.05	0.15	0.50	1.60	3.70	5.70
	50	0.04	0.08	0.19	0.60	2.10	6.70
	90	0.03	0.08	0.15	0.36	1.10	4.10

- As frequency increases, absorption tends to increase
- As Relative Humidity increases, absorption tends to decrease
- There is no direct relationship between absorption and temperature
- The net result of atmospheric absorption is to modify the sound propagation of a point source from 6 dB/doubling-of-distance to approximately 7 – 8 dB/doubling-of-distance (based on anecdotal experience)









#### **Meteorological Effects**

There are many meteorological factors which can affect how sound propagates over large distances. These various phenomena must be considered when trying to determine the relative impact of a noise source either after installation or during the design stage.

#### Wind

- Can greatly alter the noise climate away from a source depending on direction
- Sound levels downwind from a source can be increased due to refraction of sound back down towards the surface. This is due to the generally higher velocities as altitude increases.
- Sound levels upwind from a source can be decreased due to a "bending" of the sound away from the earth's surface.
- Sound level differences of  $\pm 10$ dB are possible depending on severity of wind and distance from source.
- Sound levels crosswind are generally not disturbed by an appreciable amount
- Wind tends to generate its own noise, however, and can provide a high degree of masking relative to a noise source of particular interest.

#### **Temperature**

- Temperature effects can be similar to wind effects
- Typically, the temperature is warmer at ground level than it is at higher elevations.
- If there is a very large difference between the ground temperature (very warm) and the air aloft (only a few hundred meters) then the transmitted sound refracts upward due to the changing speed of sound.
- If the air aloft is warmer than the ground temperature (known as an *inversion*) the resulting higher speed of sound aloft tends to refract the transmitted sound back down towards the ground. This essentially works on Snell's law of reflection and refraction.
- Temperature inversions typically happen early in the morning and are most common over large bodies of water or across river valleys.
- Sound level differences of ±10dB are possible depending on gradient of temperature and distance from source.

#### <u>Rain</u>

- Rain does not affect sound propagation by an appreciable amount unless it is very heavy
- The larger concern is the noise generated by the rain itself. A heavy rain striking the ground can cause a significant amount of highly broadband noise. The amount of noise generated is difficult to predict.
- Rain can also affect the output of various noise sources such as vehicle traffic.

#### <u>Summary</u>

- In general, these wind and temperature effects are difficult to predict
- Empirical models (based on measured data) have been generated to attempt to account for these effects.
- Environmental noise measurements must be conducted with these effects in mind. Sometimes it is desired to have completely calm conditions, other times a "worst case" of downwind noise levels are desired.



#### **Topographical Effects**

Similar to the various atmospheric effects outlined in the previous section, the effect of various geographical and vegetative factors must also be considered when examining the propagation of noise over large distances.

#### <u>Topography</u>

- One of the most important factors in sound propagation.
- Can provide a natural barrier between source and receiver (i.e. if berm or hill in between).
- Can provide a natural amplifier between source and receiver (i.e. large valley in between or hard reflective surface in between).
- Must look at location of topographical features relative to source and receiver to determine importance (i.e. small berm 1km away from source and 1km away from receiver will make negligible impact).

#### Grass

- Can be an effective absorber due to large area covered
- Only effective at low height above ground. Does not affect sound transmitted direct from source to receiver if there is line of sight.
- Typically less absorption than atmospheric absorption when there is line of sight.
  - Approximate rule of thumb based on empirical data is:

$$A_g = 18\log_{10}(f) - 31$$
 (*dB*/100*m*)

Where:  $A_g$  is the absorption amount

Trees

- Provide absorption due to foliage
- Deciduous trees are essentially ineffective in the winter
- Absorption depends heavily on density and height of trees
- No data found on absorption of various kinds of trees
- Large spans of trees are required to obtain even minor amounts of sound reduction
- In many cases, trees can provide an effective visual barrier, even if the noise attenuation is negligible.



NOTE —  $d_f = d_1 + d_2$ 

For calculating  $d_1$  and  $d_2$ , the curved path radius may be assumed to be 5 km.

Figure A.1 — Attenuation due to propagation through foliage increases linearly with propagation distance  $d_{\rm i}$  through the foliage

Table A.1 — Attenuation of an octave band of noise due to propagation a distance  $d_{\rm f}$  through dense foliage

Propagation distance $d_{\rm f}$	Nominal midband frequency							
				H	z			
m	63	125	250	500	1 000	2 000	4 000	8 000
	Attenuatio	on, dB:						
$10 \le d_{\rm f} \le 20$	0	0	1	1	1	1	2	3
	Attenuatio	on, dB/m:						
$20 \le d_{\rm f} \le 200$	0,02	0,03	0,04	0,05	0,06	0,08	0,09	0,12

Tree/Foliage attenuation from ISO 9613-2:1996



#### Bodies of Water

- Large bodies of water can provide the opposite effect to grass and trees.
- Reflections caused by small incidence angles (grazing) can result in larger sound levels at great distances (increased reflectivity, Q).
- Typically air temperatures are warmer high aloft since air temperatures near water surface tend to be more constant. Result is a high probability of temperature inversion.
- Sound levels can "carry" much further.

#### Snow

- Covers the ground for approximately 1/2 of the year in northern climates.
- Can act as an absorber or reflector (and varying degrees in between).
- Freshly fallen snow can be quite absorptive.
- Snow which has been sitting for a while and hard packed due to wind can be quite reflective.
- Falling snow can be more absorptive than rain, but does not tend to produce its own noise.
- Snow can cover grass which might have provided some means of absorption.
- Typically sound propagates with less impedance in winter due to hard snow on ground and no foliage on trees/shrubs.



## Appendix III SOUND LEVELS OF FAMILIAR NOISE SOURCES

Used with Permission Obtained from the Alberta Energy Regulator (AER) Directive 038 (February 2007)

Source <sup>1</sup> S	ound Level ( dBA)
-----------------------	-------------------

Bedroom of a country home	30
Soft whisper at 1.5 m	30
Quiet office or living room	40
Moderate rainfall	50
Inside average urban home	50
Quiet street	50
Normal conversation at 1 m	60
Noisy office	60
Noisy restaurant	70
Highway traffic at 15 m	75
Loud singing at 1 m	75
Tractor at 15 m	78-95
Busy traffic intersection	80
Electric typewriter	80
Bus or heavy truck at 15 m	88-94
Jackhammer	88-98
Loud shout	90
Freight train at 15 m	95
Modified motorcycle	95
Jet taking off at 600 m	100
Amplified rock music	110
Jet taking off at 60 m	120
Air-raid siren	130

<sup>&</sup>lt;sup>1</sup> Cottrell, Tom, 1980, *Noise in Alberta*, Table 1, p.8, ECA80 - 16/1B4 (Edmonton: Environment Council of Alberta).



## SOUND LEVELS GENERATED BY COMMON APPLIANCES

Used with Permission Obtained from the Alberta Energy Regulator (AER) Directive 038 (February 2007)

Source <sup>1</sup>	Sound level at 3 feet (dBA)
Freezer	38-45
Refrigerator	34-53
Electric heater	47
Hair clipper	50
Electric toothbrush	48-57
Humidifier	41-54
Clothes dryer	51-65
Air conditioner	50-67
Electric shaver	47-68
Water faucet	62
Hair dryer	58-64
Clothes washer	48-73
Dishwasher	59-71
Electric can opener	60-70
Food mixer	59-75
Electric knife	65-75
Electric knife sharpener	72
Sewing machine	70-74
Vacuum cleaner	65-80
Food blender	65-85
Coffee mill	75-79
Food waste disposer	69-90
Edger and trimmer	81
Home shop tools	64-95
Hedge clippers	85
Electric lawn mower	80-90

<sup>&</sup>lt;sup>1</sup> Reif, Z. F., and Vermeulen, P. J., 1979, "Noise from domestic appliances, construction, and industry," Table 1, p.166, in Jones, H. W., ed., *Noise in the Human Environment*, vol. 2, ECA79-SP/1 (Edmonton: Environment Council of Alberta).



## Appendix IV DATA REMOVAL

#### Data Removal Noise Monitoring Location #1

Start Time	End Time	Duration (min)	Reason
7/29/21 22:34	7/29/21 22:36	2	Non-typical
7/29/21 23:03	7/29/21 23:03	0.5	Loud Vehicle Passby
7/29/21 23:19	7/29/21 23:20	1	Loud Vehicle Passby
7/29/21 23:58	7/29/21 23:59	0.75	Loud Vehicle Passby
7/30/21 1:12	7/30/21 1:13	1	Loud Vehicle Passby
7/30/21 1:50	7/30/21 1:51	0.75	Loud Vehicle Passby
7/30/21 2:55	7/30/21 2:57	1.25	Loud Vehicle Passby
7/30/21 3:06	7/30/21 3:08	2	Train Passby
7/30/21 3:20	7/30/21 3:21	1	Loud Vehicle Passby
7/30/21 3:22	7/30/21 3:23	0.75	Loud Vehicle Passby
7/30/21 3:26	7/30/21 3:27	1	Loud Vehicle Passby
7/30/21 3:32	7/30/21 3:32	0.75	Loud Vehicle Passby
7/30/21 3:34	7/30/21 3:35	0.75	Loud Vehicle Passby
7/30/21 3:57	7/30/21 3:58	1	Loud Vehicle Passby
7/30/21 4:21	7/30/21 4:22	0.75	Loud Vehicle Passby
7/30/21 4:23	7/30/21 4:24	1	Loud Vehicle Passby
7/30/21 4:26	7/30/21 4:27	0.5	Loud Vehicle Passby
7/30/21 4:28	7/30/21 4:29	0.75	Loud Vehicle Passby
7/30/21 4:30	7/30/21 4:30	0.25	Loud Vehicle Passby
7/30/21 4:30	7/30/21 4:31	0.75	Loud Vehicle Passby
7/30/21 4:34	7/30/21 4:35	0.75	Loud Vehicle Passby
7/30/21 4:43	7/30/21 4:44	1.25	Loud Vehicle Passby
7/30/21 4:53	7/30/21 4:54	1.75	Loud Vehicle Passby
7/30/21 5:03	7/30/21 5:03	0.75	Loud Vehicle Passby
7/30/21 5:04	7/30/21 5:05	1.5	Loud Vehicle Passby
7/30/21 5:09	7/30/21 5:16	7.75	Loud Vehicle Passby
7/30/21 5:21	7/30/21 5:59	37.5	Loud Vehicle Passby
7/30/21 6:00	7/30/21 6:13	12.75	Loud Vehicle Passby
7/30/21 6:14	7/30/21 6:24	10.5	Loud Vehicle Passby
7/30/21 6:25	7/30/21 6:45	19.25	Loud Vehicle Passby
7/30/21 6:45	7/30/21 6:59	14.25	Loud Vehicle Passby
7/30/21 22:02	7/30/21 22:02	0.75	Loud Vehicle Passby
7/30/21 22:13	7/30/21 22:14	1	Loud Vehicle Passby
7/30/21 22:28	7/30/21 22:29	1	Machinery Noise
7/30/21 22:36	7/30/21 22:37	0.75	Loud Vehicle Passby
7/30/21 22:39	7/30/21 22:40	0.75	Loud Vehicle Passby
7/30/21 22:43	7/30/21 22:44	1	Loud Vehicle Passby
7/30/21 22:51	7/30/21 22:52	0.75	Loud Vehicle Passby
7/30/21 22:57	7/30/21 22:58	0.75	Loud Vehicle Passby
7/30/21 22:58	7/30/21 22:59	1	Loud Vehicle Passby
7/30/21 23:20	7/30/21 23:21	0.75	Loud Vehicle Passby
7/30/21 23:28	7/30/21 23:29	1.25	Loud Vehicle Passby
7/30/21 23:42	7/30/21 23:43	0.75	Loud Vehicle Passby
7/30/21 23:52	7/30/21 23:53	1.25	Loud Vehicle Passby
7/30/21 23:59	7/31/21 0:00	0.75	Loud Vehicle Passby



Start Time	End Time	Duration (min)	Reason
7/31/21 0:31	7/31/21 0:32	1.5	Loud Vehicle Passby
7/31/21 0:47	7/31/21 0:48	1	Loud Vehicle Passby
7/31/21 1:05	7/31/21 1:06	1.5	Loud Vehicle Passby
7/31/21 1:09	7/31/21 1:12	2.25	Loud Vehicle Passby
7/31/21 1:58	7/31/21 1:59	1	Loud Vehicle Passby
7/31/21 2:52	7/31/21 2:53	1	Loud Vehicle Passby
7/31/21 3:46	7/31/21 3:48	1.5	Loud Vehicle Passby
7/31/21 3:53	7/31/21 3:55	2	Loud Vehicle Passby
7/31/21 4:04	7/31/21 4:06	2	Loud Vehicle Passby
7/31/21 4:23	7/31/21 4:24	0.75	Loud Vehicle Passby
7/31/21 4:30	7/31/21 4:36	5.25	Loud Vehicle Passby
7/31/21 4:36	7/31/21 4:39	3.25	Loud Vehicle Passby
7/31/21 4:40	7/31/21 4:41	1	Loud Vehicle Passby
7/31/21 4:42	7/31/21 4:45	2.25	Loud Vehicle Passby
7/31/21 4:45	7/31/21 5:07	22.25	Loud Vehicle Passby
7/31/21 5:08	7/31/21 5:13	4.5	Loud Vehicle Passby
7/31/21 5:13	7/31/21 5:32	19	Loud Vehicle Passby
7/31/21 5:33	7/31/21 5:42	9.25	Loud Vehicle Passby
7/31/21 5:43	7/31/21 5:56	13.5	Loud Vehicle Passby
7/31/21 5:57	7/31/21 6:03	5.25	Loud Vehicle Passby
7/31/21 6:04	7/31/21 6:08	4.25	Loud Vehicle Passby
7/31/21 6:10	7/31/21 6:32	22	Loud Vehicle Passby
7/31/21 6:34	7/31/21 6:54	20.75	Loud Vehicle Passby
	Total Night #1	127	
	Total Night #2	159	
	Total Data	285	

#### Data Removal Noise Monitoring Location #1 Cont.



			_
Start Time	End Time	Duration (min)	Reason
7/06/21 22:00	7/06/21 22:02	1.75	Human Activity
7/06/21 22:03	7/06/21 22:04	1	Loud Vehicle Passby
7/06/21 22:06	7/06/21 22:09	3	Loud Vehicle Passby
7/06/21 22:10	7/06/21 22:13	3	Train Passby
7/06/21 22:17	7/06/21 22:18	0.75	Train Passby
7/06/21 22:18	7/06/21 22:25	6.75	Train Passby
7/06/21 22:33	7/06/21 22:33	0.5	Loud Vehicle Passby
7/06/21 23:22	7/06/21 23:22	0.75	Train Passby
7/07/21 0:32	7/07/21 0:34	1.75	Train Passby
7/07/21 0:34	7/07/21 0:35	1	Train Passby
7/07/21 0:44	7/07/21 0:45	0.75	Train Passby
7/07/21 1:22	7/07/21 1:23	0.75	Loud Vehicle Passby
7/07/21 1:27	7/07/21 1:27	0.25	Loud Vehicle Passby
7/07/21 1:33	7/07/21 1:34	1.25	Loud Vehicle Passby
7/07/21 1:39	7/07/21 1:40	0.75	Train Passby
7/07/21 2:55	7/07/21 2:56	0.75	Train Passby
7/07/21 2:56	7/07/21 2:57	0.5	Train Passby
7/07/21 2:57	7/07/21 2:58	0.75	Train Passby
7/07/21 3:18	7/07/21 3:19	0.75	Train Passby
7/07/21 3:28	7/07/21 3:29	0.75	Train Passby
7/07/21 3:29	7/07/21 3:31	1.75	Train Passby
7/07/21 3:34	7/07/21 3:37	2.25	Train Passby
7/07/21 3:47	7/07/21 3:50	2.75	Train Passby
7/07/21 3:57	7/07/21 3:59	1.25	Train Passby
7/07/21 4:44	7/07/21 4:44	0.75	Train Passby
7/07/21 4:52	7/07/21 4:52	0.5	Excessive Bird Noise
7/07/21 4:54	7/07/21 4:55	1	Loud Vehicle Passby
7/07/21 5:22	7/07/21 5:23	0.75	Loud Vehicle Passby
7/07/21 5:24	7/07/21 5:24	0.75	Loud Vehicle Passby
7/07/21 5:28	7/07/21 5:29	1	Train Passby
7/07/21 5:31	7/07/21 5:32	1.75	Train Passby
7/07/21 6:20	7/07/21 6:21	0.75	Train Passby
7/07/21 6:52	7/07/21 6:54	2	Train Passby
7/07/21 6:54	7/07/21 7:00	5.75	Train Passby
7/07/21 22:01	7/07/21 22:01	0.5	- Train Passby
7/07/21 22:02	7/07/21 22:02	0.75	Train Passby
7/07/21 22:03	7/07/21 22:03	0.75	- Train Passby
7/07/21 22:03	7/07/21 22:05	1.5	, Train Passby
7/07/21 22:05	7/07/21 22:06	1.25	Train Passby
7/07/21 22:06	7/07/21 22:07	0.75	Train Passby

#### **Data Removal Noise Monitoring Location #2**



2.00			<u>Location #2 Conta</u>
Start Time	End Time	Duration (min)	Reason
7/07/21 22:07	7/07/21 22:09	2.25	Train Passby
7/07/21 22:09	7/07/21 22:10	1	Train Passby
7/07/21 22:10	7/07/21 22:13	2.25	Train Passby
7/07/21 22:14	7/07/21 22:23	9	Train Passby
7/07/21 22:25	7/07/21 22:26	0.5	Train Passby
7/07/21 22:26	7/07/21 22:28	2	Train Passby
7/07/21 22:30	7/07/21 22:32	2	Train Passby
7/07/21 22:33	7/07/21 22:38	5.75	Train Passby
7/07/21 22:39	7/07/21 22:45	6.5	Train Passby
7/07/21 22:45	7/07/21 22:58	13	Train Passby
7/07/21 23:00	7/07/21 23:12	12.75	Train Passby
7/07/21 23:16	7/07/21 23:19	2.5	Train Passby
7/07/21 23:19	7/07/21 23:29	10.25	Train Passby
7/07/21 23:21	7/07/21 23:28	7	Train Passby
7/07/21 23:38	7/07/21 23:39	1	Train Passby
7/07/21 23:44	7/07/21 23:47	2.5	Train Passby
7/08/21 0:08	7/08/21 0:09	0.75	Train Passby
7/08/21 0:18	7/08/21 0:19	1.25	Train Passby
7/08/21 0:20	7/08/21 0:22	1.75	Train Passby
7/08/21 0:45	7/08/21 0:46	1.25	Loud Vehicle Passby
7/08/21 1:26	7/08/21 1:28	1.25	Train Passby
7/08/21 1:55	7/08/21 1:56	0.75	Train Passby
7/08/21 2:20	7/08/21 2:21	0.75	Train Passby
7/08/21 3:09	7/08/21 3:11	1.75	Train Passby
7/08/21 3:11	7/08/21 3:13	1.25	Train Passby
7/08/21 3:19	7/08/21 3:20	0.75	Train Passby
7/08/21 3:21	7/08/21 3:22	1.5	Train Passby
7/08/21 3:24	7/08/21 3:25	1	Loud Vehicle Passby
7/08/21 3:26	7/08/21 3:30	3.25	Train Passby
7/08/21 3:34	7/08/21 3:35	0.75	Train Passby
7/08/21 3:43	7/08/21 3:46	2.5	Train Passby
7/08/21 4:03	7/08/21 4:04	0.75	Train Passby
7/08/21 4:11	7/08/21 4:12	1.25	Train Passby
7/08/21 4:19	7/08/21 4:22	3	Train Passby
7/08/21 4:26	7/08/21 4:27	1.25	Train Passby
7/08/21 4:38	7/08/21 4:44	5.5	Train Passby
7/08/21 4:46	7/08/21 4:47	1	Train Passby
7/08/21 4:50	7/08/21 4:51	1	Train Passby
7/08/21 4:55	7/08/21 4:57	1.5	Train Passby
7/08/21 5:06	7/08/21 5:08	1.75	Train Passby

#### Data Removal Noise Monitoring Location #2 Cont.



200			
Start Time	End Time	Duration (min)	Reason
7/08/21 5:30	7/08/21 5:31	1.25	Loud Vehicle Passby
7/08/21 5:32	7/08/21 5:33	1.25	Loud Vehicle Passby
7/08/21 6:12	7/08/21 6:14	2	Loud Vehicle Passby
7/08/21 6:24	7/08/21 6:29	5	Excessive Bird Noise
7/08/21 6:39	7/08/21 6:41	2.25	Excessive Bird Noise
7/08/21 6:48	7/08/21 6:53	4.25	Excessive Bird Noise
7/08/21 6:56	7/08/21 6:59	2.25	Train Passby
	Total Night #1	51	
	Total Night #2	142	
		100	
	Total Data	192	

#### Data Removal Noise Monitoring Location #2 Cont.



Start Time	End Time	Duration (min)	Reason
7/06/21 22:01	7/06/21 22:03	2.25	Loud Vehicle Passby
7/06/21 22:04	7/06/21 22:04	0.5	Train Passby
7/06/21 22:08	7/06/21 22:13	4.75	Human Activity
7/06/21 22:29	7/06/21 22:31	2	Train Passby
7/06/21 22:48	7/06/21 22:50	1.75	Loud Vehicle Passby
7/06/21 23:00	7/06/21 23:02	1.25	Loud Vehicle Passby
7/06/21 23:55	7/06/21 23:55	0.5	Train Passby
7/07/21 0:07	7/07/21 0:07	0.5	Train Passby
7/07/21 0:12	7/07/21 0:15	2.75	Loud Vehicle Passby
7/07/21 0:33	7/07/21 0:35	1.5	Train Passby
7/07/21 2:30	7/07/21 2:31	0.75	Train Passby
7/07/21 2:34	7/07/21 2:36	1.5	Train Passby
7/07/21 2:49	7/07/21 2:50	0.75	Train Passby
7/07/21 2:55	7/07/21 2:56	1.25	Train Passby
7/07/21 3:12	7/07/21 3:14	1.5	Loud Vehicle Passby
7/07/21 3:46	7/07/21 3:47	1	Train Passby
7/07/21 3:57	7/07/21 3:58	1	Train Passby
7/07/21 4:13	7/07/21 4:14	1.25	Train Passby
7/07/21 4:19	7/07/21 4:29	9.25	Train Passby
7/07/21 4:30	7/07/21 4:31	1	Loud Vehicle Passby
7/07/21 4:38	7/07/21 4:39	1.75	Excessive Bird Noise
7/07/21 4:46	7/07/21 4:50	4.25	Loud Vehicle Passby
7/07/21 4:57	7/07/21 4:58	1.75	Loud Vehicle Passby
7/07/21 5:00	7/07/21 5:01	1.25	Loud Vehicle Passby
7/07/21 5:07	7/07/21 5:09	1.75	Loud Vehicle Passby
7/07/21 5:09	7/07/21 5:10	1.25	Loud Vehicle Passby
7/07/21 5:10	7/07/21 5:18	7.5	Loud Vehicle Passby
7/07/21 5:21	7/07/21 5:25	4	Loud Vehicle Passby
7/07/21 5:27	7/07/21 5:31	4	Loud Vehicle Passby
7/07/21 5:31	7/07/21 5:33	1.75	Loud Vehicle Passby
7/07/21 5:35	7/07/21 5:38	2.5	Loud Vehicle Passby
7/07/21 5:42	7/07/21 5:46	4	Loud Vehicle Passby
7/07/21 5:46	7/07/21 5:52	5.25	Loud Vehicle Passby
7/07/21 5:53	7/07/21 5:56	2.25	Loud Vehicle Passby
7/07/21 5:58	7/07/21 6:01	3.75	Loud Vehicle Passby
7/07/21 6:03	7/07/21 6:05	1.75	Loud Vehicle Passby
7/07/21 6:07	7/07/21 6:24	16.75	Loud Vehicle Passby
7/07/21 6:24	7/07/21 6:31	6.5	Loud Vehicle Passby
7/07/21 6:31	7/07/21 6:35	3.5	Loud Vehicle Passby
7/07/21 6:35	7/07/21 6:41	5.25	Loud Vehicle Passby

#### Data Removal Noise Monitoring Location #3



Start Time	End Time	Duration (min)	Reason
7/07/21 6:41	7/07/21 6:43	2	Loud Vehicle Passby
7/07/21 6:43	7/07/21 6:48	4.5	Loud Vehicle Passby
7/07/21 6:49	7/07/21 6:58	9	Loud Vehicle Passby
7/07/21 6:59	7/07/21 7:00	0.75	Loud Vehicle Passby
7/07/21 22:05	7/07/21 22:07	2	Train Passby
7/07/21 22:27	7/07/21 22:28	1	Loud Vehicle Passby
7/07/21 22:59	7/07/21 23:00	0.75	Loud Vehicle Passby
7/07/21 23:34	7/07/21 23:36	2	Loud Vehicle Passby
7/07/21 23:38	7/07/21 23:38	0.5	Train Passby
7/07/21 23:38	7/07/21 23:48	9.5	Train Passby
7/08/21 0:01	7/08/21 0:03	2.5	Loud Vehicle Passby
7/08/21 0:09	7/08/21 0:10	1.25	Train Passby
7/08/21 0:15	7/08/21 0:20	5	Train Passby
7/08/21 0:44	7/08/21 0:47	3.25	Loud Vehicle Passby
7/08/21 1:12	7/08/21 1:13	1	Loud Vehicle Passby
7/08/21 1:22	7/08/21 1:24	2	Train Passby
7/08/21 2:21	7/08/21 2:24	3.25	Loud Vehicle Passby
7/08/21 2:34	7/08/21 2:38	3.75	Train Passby
7/08/21 2:53	7/08/21 2:55	2.25	Train Passby
7/08/21 3:05	7/08/21 3:15	9.25	Train Passby
7/08/21 3:15	7/08/21 3:19	3.25	Train Passby
7/08/21 3:19	7/08/21 3:20	1.5	Loud Vehicle Passby
7/08/21 3:21	7/08/21 3:25	4	Train Passby
7/08/21 3:26	7/08/21 3:28	1.75	Train Passby
7/08/21 3:28	7/08/21 3:32	3.25	Train Passby
7/08/21 3:41	7/08/21 3:46	5	Train Passby
7/08/21 3:48	7/08/21 4:07	18.5	Train Passby
7/08/21 4:11	7/08/21 4:21	10.75	Train Passby
7/08/21 4:24	7/08/21 4:27	3.25	Train Passby
7/08/21 4:28	7/08/21 4:29	1	Loud Vehicle Passby
7/08/21 4:30	7/08/21 4:36	6.25	Train Passby
7/08/21 4:54	7/08/21 4:59	5.25	Loud Vehicle Passby
7/08/21 5:00	7/08/21 5:07	6.25	Train Passby
7/08/21 5:11	7/08/21 5:13	2.25	Loud Vehicle Passby
7/08/21 5:17	7/08/21 5:18	1	Loud Vehicle Passby
7/08/21 5:20	7/08/21 5:22	2.5	Loud Vehicle Passby
7/08/21 5:24	7/08/21 5:24	0.75	Loud Vehicle Passby
7/08/21 5:26	7/08/21 5:29	3.25	Loud Vehicle Passby
7/08/21 5:31	7/08/21 5:37	6.25	Loud Vehicle Passby
7/08/21 5:43	7/08/21 5:45	2.5	Loud Vehicle Passby

#### Data Removal Noise Monitoring Location #3 (cont.)



Start Time	End Time	Duration (min)	Reason
7/08/21 5:46	7/08/21 5:55	9.25	Loud Vehicle Passby
7/08/21 5:57	7/08/21 6:05	7.75	Loud Vehicle Passby
7/08/21 6:07	7/08/21 6:15	7.75	Loud Vehicle Passby
7/08/21 6:16	7/08/21 6:17	1	Loud Vehicle Passby
7/08/21 6:19	7/08/21 6:21	1.75	Loud Vehicle Passby
7/08/21 6:22	7/08/21 6:25	3.25	Loud Vehicle Passby
7/08/21 6:25	7/08/21 6:26	1	Train Passby
7/08/21 6:26	7/08/21 6:38	12.5	Loud Vehicle Passby
7/08/21 6:39	7/08/21 6:44	5	Loud Vehicle Passby
7/08/21 6:45	7/08/21 6:57	12.5	Loud Vehicle Passby
7/08/21 6:57	7/08/21 6:59	1.5	Loud Vehicle Passby
	Total Night #1	134	
	Total Night #2	201	
	Total Data	335	

#### Data Removal Noise Monitoring Location #3 (cont.)



Start Time	End Time	Duration (min)	Reason
7/29/21 22:01	7/29/21 22:02	1.25	Public_Address
7/29/21 22:38	7/29/21 22:39	1	Train Passby
7/29/21 23:02	7/29/21 23:08	6.25	Train Passby
7/29/21 23:37	7/29/21 23:38	1	Train Passby
7/29/21 23:48	7/29/21 23:50	1.75	Train Passby
7/29/21 23:59	7/30/21 0:00	1	Train Passby
7/30/21 0:50	7/30/21 0:51	1	Train Passby
7/30/21 0:52	7/30/21 0:52	0.75	Train Passby
7/30/21 2:13	7/30/21 2:13	0.75	Loud Vehicle Passby
7/30/21 2:14	7/30/21 2:15	1.25	Loud Vehicle Passby
7/30/21 2:38	7/30/21 2:39	1.75	Train Passby
7/30/21 2:51	7/30/21 2:53	2	Train Passby
7/30/21 2:54	7/30/21 2:56	1.25	Train Passby
7/30/21 4:25	7/30/21 4:29	3.5	Train Passby
7/30/21 5:10	7/30/21 5:12	1.5	Train Passby
7/30/21 6:04	7/30/21 6:05	0.75	Animal Noise
7/30/21 6:32	7/30/21 6:33	1.25	Excessive Bird Noise
7/30/21 7:00	7/30/21 7:01	1	Public_Address
7/30/21 22:15	7/30/21 22:18	3.5	Human Activity
7/30/21 23:45	7/30/21 23:46	1	Train Passby
7/31/21 0:13	7/31/21 0:14	1	Train Passby
7/31/21 0:18	7/31/21 0:19	0.75	Train Passby
7/31/21 0:20	7/31/21 0:21	0.5	Train Passby
7/31/21 0:26	7/31/21 0:27	1	Train Passby
7/31/21 0:27	7/31/21 0:33	6.25	Train Passby
7/31/21 0:36	7/31/21 0:37	0.5	Train Passby
7/31/21 0:39	7/31/21 0:44	5	Train Passby
7/31/21 0:47	7/31/21 0:48	1.25	Train Passby
7/31/21 0:52	7/31/21 0:52	0.75	Train Passby
7/31/21 1:19	7/31/21 1:21	2	Train Passby
7/31/21 1:42	7/31/21 1:43	1	Train Passby
7/31/21 1:49	7/31/21 1:50	1.5	Train Passby
7/31/21 1:57	7/31/21 1:59	2.5	Train Passby
7/31/21 2:04	7/31/21 2:06	1.25	Train Passby
7/31/21 2:14	7/31/21 2:15	1	Train Passby
7/31/21 2:31	7/31/21 2:33	1.25	Train Passby
7/31/21 2:34	7/31/21 2:35	1	Train Passby
7/31/21 2:36	7/31/21 2:37	0.75	Train Passby
7/31/21 3:01	7/31/21 3:02	1	Aircraft Flyover
7/31/21 3:32	7/31/21 3:33	0.75	Train Passby

#### **Data Removal Noise Monitoring Location #4**



Start Time	End Time	Duration (min)	Reason
7/31/21 3:37	7/31/21 3:40	3	Train Passby
7/31/21 3:41	7/31/21 3:42	1	Train Passby
7/31/21 3:44	7/31/21 3:44	0.75	Train Passby
7/31/21 3:49	7/31/21 3:50	1.5	Train Passby
7/31/21 3:53	7/31/21 4:02	8.5	Train Passby
7/31/21 4:09	7/31/21 4:09	0.75	Train Passby
7/31/21 4:17	7/31/21 4:20	3	Train Passby
7/31/21 4:26	7/31/21 4:29	2.5	Train Passby
7/31/21 4:30	7/31/21 4:36	6.5	Train Passby
7/31/21 4:37	7/31/21 4:38	1	Train Passby
7/31/21 4:40	7/31/21 4:44	4.5	Train Passby
7/31/21 4:45	7/31/21 4:47	1.75	Train Passby
7/31/21 4:49	7/31/21 4:50	1.5	Train Passby
7/31/21 4:52	7/31/21 4:55	3.25	Train Passby
7/31/21 4:58	7/31/21 5:00	1.75	Train Passby
7/31/21 5:03	7/31/21 5:05	2	Train Passby
7/31/21 5:07	7/31/21 5:09	1.75	Train Passby
7/31/21 5:11	7/31/21 5:18	7.25	Train Passby
7/31/21 5:21	7/31/21 5:22	1.25	Train Passby
7/31/21 5:30	7/31/21 5:32	1.5	Train Passby
7/31/21 5:35	7/31/21 5:36	0.75	Train Passby
7/31/21 5:40	7/31/21 5:43	2.75	Train Passby
7/31/21 5:45	7/31/21 5:47	1.5	Loud Vehicle Passby
7/31/21 5:51	7/31/21 5:52	1.25	Train Passby
7/31/21 5:57	7/31/21 6:00	2.25	Excessive Bird Noise
7/31/21 6:00	7/31/21 6:02	2	Train Passby
7/31/21 6:04	7/31/21 6:08	4	Excessive Bird Noise
7/31/21 6:14	7/31/21 6:16	1.75	Train Passby
7/31/21 6:16	7/31/21 6:18	1.5	Train Passby
	Total Night #1	29	
	Total Night #2	108	
	Total Data	137	

#### **Data Removal Noise Monitoring Location #4 (cont.)**



Start Time	End Time	Duration (min)	Passon
7/06/21 22:06			Train Deachy
7/06/21 22:00	7/06/21 22:07	0.75	Train Passby
7/06/21 22:13	7/06/21 22:13	0.5	Train Passby
7/06/21 22:10	7/06/21 22:21	25	
7/06/21 22.23	7/06/21 22:23	2.5	
7/06/21 22:26	7/06/21 22:28	2	Train Passby
7/06/21 22:29	7/06/21 22:29	0.25	
7/06/21 22:31	7/06/21 22:32	0.75	
7/06/21 22:44	7/06/21 22:45	1.25	Train Passby
7/06/21 22:47	7/06/21 22:51	4	Train Passby
7/06/21 23:57	7/06/21 23:58	1	Train Passby
7/07/21 0:35	7/07/21 0:36	0.75	Train Passby
7/07/21 1:29	7/07/21 1:30	1	Train Passby
7/07/21 1:33	7/07/21 1:34	0.5	Train Passby
7/07/21 3:51	7/07/21 3:55	3.75	Excessive Bird Noise
7/07/21 4:00	7/07/21 4:11	11	Excessive Bird Noise
7/07/21 4:17	7/07/21 4:23	6.5	Excessive Bird Noise
7/07/21 4:54	7/07/21 4:55	1	Train Passby
7/07/21 4:55	7/07/21 4:56	0.75	Excessive Bird Noise
7/07/21 5:34	7/07/21 5:35	1	Loud Vehicle Passby
7/07/21 5:36	7/07/21 5:37	0.75	Loud Vehicle Passby
7/07/21 6:09	7/07/21 6:10	0.75	Loud Vehicle Passby
7/07/21 6:10	7/07/21 6:11	0.75	Loud Vehicle Passby
7/07/21 6:12	7/07/21 6:13	1	Loud Vehicle Passby
7/07/21 6:43	7/07/21 6:46	3.5	Train Passby
7/07/21 22:34	7/07/21 22:40	5.5	Train Passby
7/07/21 23:10	7/07/21 23:11	0.5	Train Passby
7/07/21 23:30	7/07/21 23:31	1.25	Train Passby
7/08/21 0:08	7/08/21 0:09	0.75	Train Passby
7/08/21 0:39	7/08/21 0:41	2.5	Loud Vehicle Passby
7/08/21 0:40	7/08/21 0:41	1	Loud Vehicle Passby
7/08/21 1:36	7/08/21 1:36	0.5	Train Passby
7/08/21 2:47	7/08/21 2:48	1	Train Passby
7/08/21 2:50	7/08/21 2:50	0.5	Train Passby
7/08/21 2:58	7/08/21 3:01	3.25	Train Passby
7/08/21 3:52	7/08/21 4:15	23	Excessive Bird Noise
7/08/21 4:15	7/08/21 4:29	13,75	Excessive Bird Noise
7/08/21 5:35	7/08/21 5:36	1	Loud Vehicle Passby
7/08/21 5:38	7/08/21 5:39	1	Loud Vehicle Passby
7/08/21 5:54	7/08/21 5:54	0.75	Train Passby
7/08/21 5:57	7/08/21 5:58	1.25	Train Passby
7/08/21 6:05	7/08/21 6:06	1	Loud Vehicle Passby
7/08/21 6:18	7/08/21 6:18	0.75	Loud Vehicle Passby
7/08/21 6:32	7/08/21 6:33	0.76	Loud Vehicle Passby
7/08/21 6:44	7/08/21 6:45	1.25	Loud Vehicle Passby
7/08/21 6:46	7/08/21 6:49	1.25	Loud Vehicle Passby
7/08/21 6:40	7/08/21 0.40	0.05	Loud Vehicle Passby
7/08/21 0.49	7/06/21 0.51	2.25	Loud vehicle Passby
		10	
	Total Night #1	49	
	Total Night #2	65	
	· · · · · · · · · · · · · · · · · · ·		
	Total Data	114	

## Data Removal Noise Monitoring Location #5



Start Time	End Time	Duration (min)	Reason
7/29/21 22:17	7/29/21 22:17	0.5	Coyote
7/30/21 0:18	7/30/21 0:21	2.75	Train Passby
7/30/21 0:26	7/30/21 0:27	1	Train Passby
7/30/21 1:28	7/30/21 1:34	5.5	Animal Noise
7/30/21 2:01	7/30/21 2:02	1.5	Loud Vehicle Passby
7/30/21 2:07	7/30/21 2:14	7.25	Animal Noise
7/30/21 2:26	7/30/21 2:28	1.75	Animal Noise
7/30/21 2:30	7/30/21 2:31	1.25	Animal Noise
7/30/21 2:34	7/30/21 2:35	0.75	Animal Noise
7/30/21 2:41	7/30/21 2:42	0.75	Animal Noise
7/30/21 2:46	7/30/21 2:49	3.5	Coyote
7/30/21 2:57	7/30/21 2:58	1	Animal Noise
7/30/21 3:11	7/30/21 3:15	3.25	Animal Noise
7/30/21 3:26	7/30/21 3:27	0.75	Animal Noise
7/30/21 3:34	7/30/21 3:34	0.5	Animal Noise
7/30/21 3:35	7/30/21 3:37	2	Animal Noise
7/30/21 4:18	7/30/21 4:19	1.25	Animal Noise
7/30/21 5:57	7/30/21 5:58	1	Loud Vehicle Passby
7/31/21 1:01	7/31/21 1:01	0.5	Train Passby
7/31/21 1:43	7/31/21 1:46	3	Train Passby
7/31/21 3:04	7/31/21 3:06	1.75	Train Passby
7/31/21 3:34	7/31/21 3:36	1.25	Loud Vehicle Passby
7/31/21 4:38	7/31/21 4:41	3.5	Train Passby
7/31/21 6:33	7/31/21 6:34	0.5	Animal Noise
	Total Night #1	36	
	Total Night #2	11	
	Total Data	47	

#### **Data Removal Noise Monitoring Location #6**


Start Time	End Time	Duration (min)	Reason
7/06/21 23:07	7/06/21 23:10	3	Loud Vehicle Passby
7/06/21 23:12	7/06/21 23:13	1	Loud Vehicle Passby
7/07/21 3:49	7/07/21 3:50	1.5	Loud Vehicle Passby
7/07/21 3:52	7/07/21 3:53	1	Loud Vehicle Passby
7/07/21 6:27	7/07/21 6:28	1	Excessive Bird Noise
7/07/21 6:29	7/07/21 6:33	3.75	Excessive Bird Noise
7/07/21 22:38	7/07/21 22:39	1	Train Passby
7/07/21 23:47	7/07/21 23:49	1.75	Train Passby
7/07/21 23:55	7/07/21 23:55	0.5	Train Passby
7/08/21 0:01	7/08/21 0:02	1.5	Train Passby
7/08/21 0:08	7/08/21 0:09	1	Train Passby
7/08/21 0:14	7/08/21 0:15	1	Train Passby
7/08/21 1:36	7/08/21 1:37	0.75	Train Passby
7/08/21 1:43	7/08/21 1:44	0.75	Train Passby
7/08/21 2:15	7/08/21 2:16	0.75	Loud Vehicle Passby
7/08/21 2:19	7/08/21 2:22	3.25	Loud Vehicle Passby
7/08/21 5:47	7/08/21 5:47	0.75	Loud Vehicle Passby
7/08/21 5:49	7/08/21 5:52	3	Machinery Noise
7/08/21 5:55	7/08/21 6:11	15.25	Machinery Noise
7/08/21 6:20	7/08/21 6:21	1.75	Loud Vehicle Passby
7/08/21 6:41	7/08/21 6:49	8.5	Train Passby
7/08/21 6:49	7/08/21 6:52	2.25	Train Passby
	Total Night #1	11	
	Total Night #2	44	
	Total Data	55	

### **Data Removal Noise Monitoring Location #8**



Start Time	End Time	Duration (min)	Reason
7/06/21 22:00	7/06/21 22:00	0.5	Loud Vehicle Passby
7/06/21 22:08	7/06/21 22:10	2	Train Passby
7/06/21 22:12	7/06/21 22:13	1	Excessive Bird Noise
7/06/21 22:25	7/06/21 22:26	1.5	Loud Vehicle Passby
7/06/21 22:36	7/06/21 22:37	1.25	Loud Vehicle Passby
7/06/21 22:40	7/06/21 22:41	1	Loud Vehicle Passby
7/06/21 22:41	7/06/21 22:55	13.75	Train Passby
7/06/21 22:42	7/06/21 22:43	1	Loud Vehicle Passby
7/06/21 22:45	7/06/21 22:46	0.75	Excessive Bird Noise
7/06/21 22:56	7/06/21 22:57	0.75	Train Passby
7/06/21 23:10	7/06/21 23:15	5.25	Train Passby
7/06/21 23:21	7/06/21 23:22	1	Train Passby
7/06/21 23:26	7/06/21 23:30	4	Train Passby
7/06/21 23:43	7/06/21 23:44	1.75	Train Passby
7/07/21 0:29	7/07/21 0:32	2.75	Train Passby
7/07/21 1:24	7/07/21 1:25	1	Loud Vehicle Passby
7/07/21 1:35	7/07/21 1:37	1.25	Loud Vehicle Passby
7/07/21 3:31	7/07/21 3:31	0.5	Train Passby
7/07/21 3:57	7/07/21 3:58	0.75	Train Passby
7/07/21 4:29	7/07/21 4:29	0.75	Loud Vehicle Passby
7/07/21 4:51	7/07/21 4:52	0.75	Excessive Bird Noise
7/07/21 5:26	7/07/21 5:27	1	Loud Vehicle Passby
7/07/21 5:27	7/07/21 5:38	10.5	Train Passby
7/07/21 6:03	7/07/21 6:04	1	Loud Vehicle Passby
7/07/21 6:10	7/07/21 6:16	5.5	Loud Vehicle Passby
7/07/21 6:17	7/07/21 6:19	1.5	Train Passby
7/07/21 6:26	7/07/21 6:28	2	Excessive Bird Noise
7/07/21 6:35	7/07/21 6:37	2.5	Loud Vehicle Passby
7/07/21 6:40	7/07/21 6:41	0.75	Loud Vehicle Passby
7/07/21 6:46	7/07/21 6:50	3.75	Loud Vehicle Passby
7/07/21 6:55	7/07/21 6:58	2.75	Loud Vehicle Passby
7/07/21 22:05	7/07/21 22:06	1.75	Train Passby
7/07/21 22:29	7/07/21 22:29	0.5	Loud Vehicle Passby
7/07/21 22:35	7/07/21 22:37	2.75	Loud Vehicle Passby
7/07/21 22:39	7/07/21 22:40	1	Loud Vehicle Passby
7/07/21 22:59	7/07/21 23:00	0.75	Loud Vehicle Passby
7/07/21 23:38	7/07/21 23:39	1	Train Passby
7/07/21 23:59	7/07/21 23:59	0.75	Loud Vehicle Passby
7/08/21 0:08	7/08/21 0:09	1	Train Passby
7/08/21 0:17	7/08/21 0:19	1.5	Train Passby
7/08/21 0:20	7/08/21 0:21	1.25	Train Passby
7/08/21 0:46	7/08/21 0:47	1.5	Loud Vehicle Passby
7/08/21 0:53	7/08/21 0:54	1.5	Loud Vehicle Passby
7/08/21 1:03	7/08/21 1:04	1	Loud Vehicle Passby
7/08/21 1:28	7/08/21 1:30	2.25	Loud Vehicle Passby
7/08/21 1:53	7/08/21 1:55	1.75	Loud Vehicle Passby
7/08/21 1:57	7/08/21 1:59	1.25	Loud Vehicle Passby
7/08/21 2:17	7/08/21 2:20	3	Train Passby
7/08/21 3:11	7/08/21 3:29	18	Train Passby
7/08/21 3:46	7/08/21 3:48	2.75	Loud Vehicle Passby

## Data Removal Noise Monitoring Location #9



Start Time	End Time	Duration (min)	Reason
7/08/21 3:55	7/08/21 3:56	1.5	Loud Vehicle Passby
7/08/21 4:21	7/08/21 4:22	0.75	Loud Vehicle Passby
7/08/21 4:31	7/08/21 4:32	0.5	Loud Vehicle Passby
7/08/21 4:36	7/08/21 4:37	0.75	Excessive Bird Noise
7/08/21 5:04	7/08/21 5:07	3.5	Loud Vehicle Passby
7/08/21 5:50	7/08/21 5:53	2.25	Loud Vehicle Passby
7/08/21 6:05	7/08/21 6:06	0.75	Loud Vehicle Passby
7/08/21 6:24	7/08/21 6:24	0.75	Loud Vehicle Passby
7/08/21 6:56	7/08/21 6:57	1	Loud Vehicle Passby
7/08/21 3:55	7/08/21 3:56	1.5	Loud Vehicle Passby
	Total Night #1	75	
	Total Night #2	57	
	· · · · · · · · · · · · · · · · · · ·		
	Total Data	132	

## Data Removal Noise Monitoring Location #9 (cont.)



Start Time	End Time	Duration (min)	Reason
7/06/21 22:02	7/06/21 22:03	1.25	Loud Vehicle Passby
7/06/21 22:07	7/06/21 22:08	1	Loud Vehicle Passby
7/06/21 22:09	7/06/21 22:10	0.75	Loud Vehicle Passby
7/06/21 22:19	7/06/21 22:20	1	Loud Vehicle Passby
7/06/21 22:23	7/06/21 22:27	3.75	Loud Vehicle Passby
7/06/21 22:38	7/06/21 22:39	1	Loud Vehicle Passby
7/06/21 22:44	7/06/21 22:45	1	Loud Vehicle Passby
7/06/21 22:51	7/06/21 22:53	2.5	Train Passby
7/06/21 22:56	7/06/21 22:57	1	Loud Vehicle Passby
7/06/21 23:14	7/06/21 23:21	7	Train Passby
7/06/21 23:21	7/06/21 23:22	1	Train Passby
7/06/21 23:23	7/06/21 23:23	0.25	Train Passby
7/06/21 23:35	7/06/21 23:36	1	Loud Vehicle Passby
7/06/21 23:44	7/06/21 23:45	1.25	Loud Vehicle Passby
7/07/21 0:18	7/07/21 0:19	1	Loud Vehicle Passby
7/07/21 0:28	7/07/21 0:29	1	Loud Vehicle Passby
7/07/21 1:25	7/07/21 1:27	1.5	Loud Vehicle Passby
7/07/21 1:37	7/07/21 1:38	1.25	Loud Vehicle Passby
7/07/21 3:07	7/07/21 3:08	1	Loud Vehicle Passby
7/07/21 4:23	7/07/21 4:24	1	Loud Vehicle Passby
7/07/21 4:25	7/07/21 4:26	0.75	Loud Vehicle Passby
7/07/21 4:39	7/07/21 4:42	2.75	Loud Vehicle Passby
7/07/21 4:46	7/07/21 4:48	2	Loud Vehicle Passby
7/07/21 4:51	7/07/21 4:52	1.5	Loud Vehicle Passby
7/07/21 4:53	7/07/21 4:54	1	Loud Vehicle Passby
7/07/21 4:56	7/07/21 4:59	2.75	Loud Vehicle Passby
7/07/21 5:00	7/07/21 5:01	1	Loud Vehicle Passby
7/07/21 5:03	7/07/21 5:04	1.75	Loud Vehicle Passby
7/07/21 5:07	7/07/21 5:11	4.5	Loud Vehicle Passby
7/07/21 5:13	7/07/21 5:14	1.75	Loud Vehicle Passby
7/07/21 5:16	7/07/21 5:18	2	Loud Vehicle Passby
7/07/21 5:19	7/07/21 5:23	4	Loud Vehicle Passby
7/07/21 5:27	7/07/21 5:30	2.25	Loud Vehicle Passby
7/07/21 5:31	7/07/21 5:35	4	Loud Vehicle Passby
7/07/21 5:35	7/07/21 5:41	5.5	Loud Vehicle Passby
7/07/21 5:43	7/07/21 5:52	9.25	Loud Vehicle Passby
7/07/21 5:55	7/07/21 6:02	7.25	Loud Vehicle Passby
7/07/21 6:03	7/07/21 6:21	17.75	Loud Vehicle Passby
7/07/21 6:22	7/07/21 6:31	8.75	Loud Vehicle Passby
7/07/21 6:32	7/07/21 6:35	3	Loud Vehicle Passby

## **Data Removal Noise Monitoring Location #10**



Start Time	End Time	Duration (min)	Reason
7/07/21 6:36	7/07/21 6:38	1.75	Loud Vehicle Passby
7/07/21 6:38	7/07/21 6:42	3.75	Loud Vehicle Passby
7/07/21 6:43	7/07/21 6:57	14.5	Loud Vehicle Passby
7/07/21 6:58	7/07/21 7:00	2.25	Loud Vehicle Passby
7/07/21 22:03	7/07/21 22:04	0.75	Loud Vehicle Passby
7/07/21 22:05	7/07/21 22:06	1.25	Loud Vehicle Passby
7/07/21 22:09	7/07/21 22:10	1.25	Loud Vehicle Passby
7/07/21 22:14	7/07/21 22:16	2	Loud Vehicle Passby
7/07/21 22:27	7/07/21 22:28	0.75	Loud Vehicle Passby
7/07/21 22:33	7/07/21 22:36	3	Loud Vehicle Passby
7/07/21 22:39	7/07/21 22:41	2	Train Passby
7/07/21 22:45	7/07/21 22:47	2.75	Loud Vehicle Passby
7/07/21 22:54	7/07/21 22:55	1.5	Loud Vehicle Passby
7/07/21 23:05	7/07/21 23:05	0.75	Loud Vehicle Passby
7/07/21 23:14	7/07/21 23:15	1.5	Loud Vehicle Passby
7/07/21 23:38	7/07/21 23:39	0.75	Loud Vehicle Passby
7/07/21 23:43	7/07/21 23:44	0.75	Loud Vehicle Passby
7/07/21 23:58	7/08/21 0:07	9.25	Train Passby
7/08/21 0:11	7/08/21 0:12	1	Loud Vehicle Passby
7/08/21 0:13	7/08/21 0:14	0.75	Loud Vehicle Passby
7/08/21 0:18	7/08/21 0:19	0.75	Train Passby
7/08/21 0:20	7/08/21 0:21	1	Train Passby
7/08/21 0:24	7/08/21 0:26	1.75	Train Passby
7/08/21 0:26	7/08/21 0:27	1.25	Loud Vehicle Passby
7/08/21 0:53	7/08/21 0:54	1.25	Loud Vehicle Passby
7/08/21 1:08	7/08/21 1:11	2.25	Loud Vehicle Passby
7/08/21 1:17	7/08/21 1:18	1	Loud Vehicle Passby
7/08/21 1:30	7/08/21 1:31	1.25	Loud Vehicle Passby
7/08/21 1:47	7/08/21 1:48	1	Train Passby
7/08/21 1:51	7/08/21 1:53	1.25	Loud Vehicle Passby
7/08/21 2:16	7/08/21 2:18	1.5	Loud Vehicle Passby
7/08/21 2:25	7/08/21 2:25	0.75	Train Passby
7/08/21 2:27	7/08/21 2:28	0.75	Train Passby
7/08/21 2:40	7/08/21 2:41	0.75	Train Passby
7/08/21 3:06	7/08/21 3:08	2	Loud Vehicle Passby
7/08/21 3:13	7/08/21 3:15	1.5	Loud Vehicle Passby
7/08/21 3:16	7/08/21 3:17	1	Train Passby
7/08/21 3:20	7/08/21 3:22	2.75	Train Passby
7/08/21 3:27	7/08/21 3:28	1	Loud Vehicle Passby
7/08/21 3:47	7/08/21 3:49	2.25	Loud Vehicle Passby

## Data Removal Noise Monitoring Location #10 (cont.)



Start Time	End Time	Duration (min)	Reason
7/08/21 4:01	7/08/21 4:02	0.75	Loud Vehicle Passby
7/08/21 4:03	7/08/21 4:04	0.75	Loud Vehicle Passby
7/08/21 4:23	7/08/21 4:24	0.75	Loud Vehicle Passby
7/08/21 4:40	7/08/21 4:41	0.75	Loud Vehicle Passby
7/08/21 4:43	7/08/21 4:43	0.75	Loud Vehicle Passby
7/08/21 4:46	7/08/21 4:47	1.5	Loud Vehicle Passby
7/08/21 4:51	7/08/21 4:52	1.25	Loud Vehicle Passby
7/08/21 4:53	7/08/21 4:54	1	Loud Vehicle Passby
7/08/21 4:57	7/08/21 4:58	1.25	Loud Vehicle Passby
7/08/21 4:59	7/08/21 5:00	1	Loud Vehicle Passby
7/08/21 5:03	7/08/21 5:04	1	Loud Vehicle Passby
7/08/21 5:04	7/08/21 5:05	1	Loud Vehicle Passby
7/08/21 5:05	7/08/21 5:08	2.5	Loud Vehicle Passby
7/08/21 5:11	7/08/21 5:12	1	Loud Vehicle Passby
7/08/21 5:13	7/08/21 5:13	0.75	Loud Vehicle Passby
7/08/21 5:17	7/08/21 5:18	0.75	Loud Vehicle Passby
7/08/21 5:19	7/08/21 5:22	2.75	Loud Vehicle Passby
7/08/21 5:22	7/08/21 5:24	2	Loud Vehicle Passby
7/08/21 5:27	7/08/21 5:27	0.5	Loud Vehicle Passby
7/08/21 5:28	7/08/21 5:30	2.25	Loud Vehicle Passby
7/08/21 5:31	7/08/21 5:32	0.75	Loud Vehicle Passby
7/08/21 5:32	7/08/21 5:35	2.25	Loud Vehicle Passby
7/08/21 5:36	7/08/21 5:37	1	Loud Vehicle Passby
7/08/21 5:38	7/08/21 5:39	0.75	Loud Vehicle Passby
7/08/21 5:42	7/08/21 5:43	1.75	Loud Vehicle Passby
7/08/21 5:43	7/08/21 5:44	1	Loud Vehicle Passby
7/08/21 5:44	7/08/21 5:46	1.25	Loud Vehicle Passby
7/08/21 5:46	7/08/21 5:47	1.5	Loud Vehicle Passby
7/08/21 5:48	7/08/21 5:48	0.75	Loud Vehicle Passby
7/08/21 5:49	7/08/21 5:50	1	Loud Vehicle Passby
7/08/21 5:51	7/08/21 5:52	1	Loud Vehicle Passby
7/08/21 5:53	7/08/21 5:54	1	Loud Vehicle Passby
7/08/21 5:55	7/08/21 6:00	5.25	Loud Vehicle Passby
7/08/21 6:02	7/08/21 6:03	1	Loud Vehicle Passby
7/08/21 6:03	7/08/21 6:09	5.75	Loud Vehicle Passby
7/08/21 6:09	7/08/21 6:12	3	Loud Vehicle Passby
7/08/21 6:13	7/08/21 6:17	4	Loud Vehicle Passby
7/08/21 6:17	7/08/21 6:23	5.5	Loud Vehicle Passby
7/08/21 6:23	7/08/21 6:27	4.25	Loud Vehicle Passby
7/08/21 6:28	7/08/21 6:33	4.75	Loud Vehicle Passby

#### Data Removal Noise Monitoring Location #10 (cont.)



Start Time	End Time	Duration (min)	Reason
7/08/21 6:34	7/08/21 6:43	8.75	Loud Vehicle Passby
7/08/21 6:44	7/08/21 6:46	2	Loud Vehicle Passby
7/08/21 6:47	7/08/21 6:52	5	Loud Vehicle Passby
7/08/21 6:53	7/08/21 6:57	4.75	Loud Vehicle Passby
7/08/21 6:58	7/08/21 6:59	0.75	Loud Vehicle Passby
7/08/21 6:59	7/08/21 7:00	1	Loud Vehicle Passby
	Total Night #1	136	
	Total Night #2	151	
	Total Data	287	

## Data Removal Noise Monitoring Location #10 (cont.)



Start Time	End Time	Duration (min)	Reason
7/06/21 22:12	7/06/21 22:14	2	Train Passby
7/06/21 22:17	7/06/21 22:17	0.25	Abnormal Noise
7/06/21 22:23	7/06/21 22:24	0.5	Train Passby
7/06/21 22:27	7/06/21 22:28	1	Train Passby
7/06/21 22:31	7/06/21 22:31	0.75	Shunting
7/06/21 22:42	7/06/21 22:43	1	Rail Activity
7/06/21 22:44	7/06/21 22:44	0.25	Rail Activity
7/06/21 22:48	7/06/21 22:49	0.75	Rail Activity
7/06/21 22:53	7/06/21 22:54	1.5	Rail Activity
7/06/21 22:59	7/06/21 23:00	1	Rail Activity
7/06/21 23:04	7/06/21 23:05	1	Rail Activity
7/06/21 23:10	7/06/21 23:12	2.25	Rail Activity
7/06/21 23:14	7/06/21 23:15	1	Rail Activity
7/06/21 23:15	7/06/21 23:18	2.75	Rail Activity
7/06/21 23:20	7/06/21 23:22	2	Rail Activity
7/06/21 23:23	7/06/21 23:26	2.5	Rail Activity
7/06/21 23:27	7/06/21 23:32	5.25	Rail Activity
7/06/21 23:35	7/06/21 23:36	1.25	Rail Activity
7/06/21 23:38	7/06/21 23:41	3.25	Train Passby
7/06/21 23:42	7/06/21 23:55	13.5	Rail Activity
7/06/21 23:57	7/07/21 0:05	8.5	Rail Activity
7/07/21 0:06	7/07/21 0:10	4.5	Rail Activity
7/07/21 0:11	7/07/21 0:13	2	Rail Activity
7/07/21 0:22	7/07/21 0:24	1.75	Rail Activity
7/07/21 0:27	7/07/21 0:37	10.25	Rail Activity
7/07/21 0:38	7/07/21 0:43	4.75	Rail Activity
7/07/21 0:44	7/07/21 0:49	5.25	Rail Activity
7/07/21 0:50	7/07/21 1:06	15.5	Rail Activity
7/07/21 1:06	7/07/21 1:07	1	Rail Activity
7/07/21 1:07	7/07/21 1:17	9.75	Rail Activity
7/07/21 1:21	7/07/21 1:22	1.5	Rail Activity
7/07/21 1:31	7/07/21 1:33	1.5	Rail Activity
7/07/21 1:39	7/07/21 1:50	10.25	Rail Activity
7/07/21 1:50	7/07/21 1:52	1.75	Rail Activity
7/07/21 1:56	7/07/21 2:16	20.25	Rail Activity
7/07/21 2:22	7/07/21 2:23	1.25	Rail Activity
7/07/21 2:24	7/07/21 2:30	5.5	Rail Activity
7/07/21 2:31	7/07/21 2:36	5	Rail Activity
7/07/21 2:39	7/07/21 3:01	22	Rail Activity
7/07/21 3:14	7/07/21 3:14	0.75	Rail Activity

#### **Data Removal Noise Monitoring Location #11**



Start Time	End Time	Duration (min)	Reason
7/07/21 3:34	7/07/21 3:36	1.25	Rail Activity
7/07/21 4:30	7/07/21 4:31	0.75	Animal Noise
7/07/21 4:36	7/07/21 4:37	1.25	Animal Noise
7/07/21 4:58	7/07/21 5:01	2.25	Rail Activity
7/07/21 5:33	7/07/21 5:34	1.5	Loud Vehicle Passby
7/07/21 5:37	7/07/21 5:37	0.5	Animal Noise
7/07/21 5:41	7/07/21 5:42	0.75	Excessive Bird Noise
7/07/21 6:02	7/07/21 6:03	0.75	Loud Vehicle Passby
7/07/21 6:46	7/07/21 6:47	1.5	Excessive Bird Noise
7/07/21 22:00	7/07/21 22:07	7	Rail Activity
7/07/21 22:15	7/07/21 22:18	3.5	Rail Activity
7/07/21 22:23	7/07/21 22:24	0.75	Rail Activity
7/07/21 22:31	7/07/21 22:32	0.75	Rail Activity
7/07/21 22:33	7/07/21 22:38	5.5	Rail Activity
7/07/21 22:43	7/07/21 22:44	0.75	Rail Activity
7/07/21 22:53	7/07/21 22:54	1	Rail Activity
7/07/21 23:02	7/07/21 23:04	1.75	Rail Activity
7/07/21 23:13	7/07/21 23:14	1.25	Rail Activity
7/07/21 23:31	7/07/21 23:36	5.75	Rail Activity
7/07/21 23:44	7/07/21 23:46	1.75	Rail Activity
7/07/21 23:48	7/07/21 23:50	1.5	Rail Activity
7/07/21 23:53	7/07/21 23:55	2	Rail Activity
7/07/21 23:57	7/08/21 0:04	6.5	Rail Activity
7/08/21 0:08	7/08/21 0:10	1.5	Rail Activity
7/08/21 0:11	7/08/21 0:13	1.75	Rail Activity
7/08/21 0:15	7/08/21 0:17	2	Rail Activity
7/08/21 0:17	7/08/21 0:18	0.75	Rail Activity
7/08/21 0:19	7/08/21 0:30	10.5	Rail Activity
7/08/21 0:31	7/08/21 0:32	1	Rail Activity
7/08/21 0:32	7/08/21 0:47	15	Rail Activity
7/08/21 0:48	7/08/21 1:20	32.75	Rail Activity
7/08/21 1:22	7/08/21 1:23	1.75	Rail Activity
7/08/21 1:26	7/08/21 1:37	10.75	Rail Activity
7/08/21 1:39	7/08/21 1:44	5	Rail Activity
7/08/21 1:46	7/08/21 1:58	11.5	Rail Activity
7/08/21 1:59	7/08/21 2:00	0.75	Rail Activity
7/08/21 2:01	7/08/21 2:03	2	Rail Activity
7/08/21 2:05	7/08/21 2:07	2.5	Rail Activity
7/08/21 2:09	7/08/21 2:14	4.5	Rail Activity
7/08/21 2:15	7/08/21 2:15 7/08/21 2:31		Rail Activity

### Data Removal Noise Monitoring Location #11 (cont.)



Start Time	End Time	Duration (min)	Reason
7/08/21 2:32	7/08/21 2:33	1.25	Rail Activity
7/08/21 2:34	7/08/21 2:43	8.75	Rail Activity
7/08/21 2:44	7/08/21 2:52	8	Rail Activity
7/08/21 2:52	7/08/21 2:56	4.25	Rail Activity
7/08/21 3:00	7/08/21 3:01	0.75	Rail Activity
7/08/21 3:03	7/08/21 3:04	1	Rail Activity
7/08/21 3:05	7/08/21 3:07	1.75	Rail Activity
7/08/21 3:08	7/08/21 3:14	5.25	Rail Activity
7/08/21 3:16	7/08/21 3:17	1	Rail Activity
7/08/21 3:18	7/08/21 3:19	0.5	Rail Activity
7/08/21 3:22	7/08/21 3:24	1.25	Rail Activity
7/08/21 3:27	7/08/21 3:28	1	Rail Activity
7/08/21 3:37	7/08/21 3:38	0.5	Rail Activity
7/08/21 3:45	7/08/21 3:46	0.75	Rail Activity
7/08/21 4:11	7/08/21 4:12	0.75	Rail Activity
7/08/21 4:18	7/08/21 4:25	6.75	Rail Activity
7/08/21 4:36	7/08/21 4:44	7.5	Rail Activity
7/08/21 4:48	7/08/21 4:50	2	Rail Activity
7/08/21 4:52	7/08/21 4:55	2.75	Rail Activity
7/08/21 4:55	7/08/21 4:56	0.75	Rail Activity
7/08/21 4:58	7/08/21 4:58	0.5	Rail Activity
7/08/21 5:04	7/08/21 5:05	1	Rail Activity
7/08/21 5:14	7/08/21 5:16	1.75	Rail Activity
7/08/21 5:33	7/08/21 5:35	1.75	Loud Vehicle Passby
7/08/21 5:46	7/08/21 5:47	0.75	Animal Noise
7/08/21 5:48	7/08/21 5:50	2.25	Loud Vehicle Passby
7/08/21 5:57	7/08/21 5:58	0.75	Rail Activity
7/08/21 6:19	7/08/21 6:19	0.5	Rail Activity
7/08/21 6:21	7/08/21 6:22	1	Rail Activity
7/08/21 6:33	7/08/21 6:34	1	Rail Activity
7/08/21 6:37	7/08/21 6:39	1.5	Rail Activity
7/08/21 6:39	7/08/21 6:42	2.75	Rail Activity
7/08/21 6:44	7/08/21 6:46	2	Rail Activity
7/08/21 6:46	7/08/21 6:47	1	Rail Activity
7/08/21 6:48	7/08/21 6:52	3.75	Rail Activity
7/08/21 7:00	7/08/21 7:00	0.75	Rail Activity

## Data Removal Noise Monitoring Location #11 (cont.)



Start Time	End Time	Duration (min)	Reason
	Total Night #1	187	
	Total Night #2	240	
	Total Data	427	

### Data Removal Noise Monitoring Location #11 (cont.)



Start Time	End Time	Duration (min)	Reason
7/06/21 22:00	7/06/21 22:00	0.25	Train Passby
7/06/21 22:00	7/06/21 22:11	10.75	Train Passby
7/06/21 22:27	7/06/21 22:40	13.25	Train Passby
7/06/21 22:57	7/06/21 22:59	1.25	Train Passby
7/06/21 23:01	7/06/21 23:02	1.25	Train Passby
7/06/21 23:27	7/06/21 23:28	1.5	Loud Vehicle Passby
7/07/21 0:09	7/07/21 0:11	1.5	Aircraft Flyover
7/07/21 0:26	7/07/21 0:28	1.5	Loud Vehicle Passby
7/07/21 0:30	7/07/21 0:31	1.25	Loud Vehicle Passby
7/07/21 1:53	7/07/21 1:55	1.25	Train Passby
7/07/21 2:00	7/07/21 2:02	2.25	Train Passby
7/07/21 2:31	7/07/21 2:37	5.75	Train Passby
7/07/21 2:42	7/07/21 2:43	1	Train Passby
7/07/21 2:44	7/07/21 2:59	14.5	Train Passby
7/07/21 3:13	7/07/21 3:22	9.25	Train Passby
7/07/21 3:57	7/07/21 3:58	0.75	Train Passby
7/07/21 4:13	7/07/21 4:17	4	Morning Chorus
7/07/21 4:19	7/07/21 4:30	10.5	Morning Chorus
7/07/21 4:57	7/07/21 5:03	6	Morning Chorus
7/07/21 5:32	7/07/21 5:41	9	Train Passby
7/07/21 6:18	7/07/21 6:19	1.5	Loud Vehicle Passby
7/07/21 6:22	7/07/21 6:22	0.75	Loud Vehicle Passby
7/07/21 6:26	7/07/21 6:26	0.75	Loud Vehicle Passby
7/07/21 6:27	7/07/21 6:28	1	Loud Vehicle Passby
7/07/21 6:29	7/07/21 6:30	0.75	Loud Vehicle Passby
7/07/21 6:35	7/07/21 6:35	0.5	Loud Vehicle Passby
7/07/21 6:36	7/07/21 6:37	0.75	Loud Vehicle Passby
7/07/21 6:37	7/07/21 6:39	1.5	Loud Vehicle Passby
7/07/21 6:39	7/07/21 6:43	3.5	Train Passby
7/07/21 6:44	7/07/21 6:45	1	Excessive Bird Noise
7/07/21 6:46	7/07/21 6:47	1.25	Loud Vehicle Passby
7/07/21 6:48	7/07/21 6:48	0.5	Loud Vehicle Passby
7/07/21 6:49	7/07/21 6:50	1.75	Train Passby
7/07/21 6:51	7/07/21 6:52	0.75	Excessive Bird Noise
7/07/21 6:53	7/07/21 6:53	0.75	Excessive Bird Noise
7/07/21 22:01	7/07/21 22:07	5.75	Train Passby
7/07/21 22:11	7/07/21 22:12	1	Loud Vehicle Passby
7/07/21 22:24	7/07/21 22:30	5.5	Train Passby
7/07/21 22:37	7/07/21 22:37	0.5	Train Passby
7/07/21 22:48	7/07/21 22:48	0.25	Abnormal Noise

## Data Removal Noise Monitoring Location #12 (Night 1)



Start Time	End Time	Duration (min)	Reason
7/07/21 23:24	7/07/21 23:25	1	Train Passby
7/07/21 23:28	7/07/21 23:31	3	Coyote
7/07/21 23:34	7/07/21 23:37	3.75	Train Passby
7/07/21 23:47	7/07/21 23:49	1.75	Coyote
7/08/21 0:02	7/08/21 0:04	1.25	Train Passby
7/08/21 0:06	7/08/21 0:07	0.5	Train Passby
7/08/21 0:10	7/08/21 0:10	0.5	Train Passby
7/08/21 0:28	7/08/21 0:29	1	Train Passby
7/08/21 0:48	7/08/21 0:50	1.5	Train Passby
7/08/21 0:55	7/08/21 0:58	3	Train Passby
7/08/21 1:12	7/08/21 1:13	0.75	Coyote
7/08/21 1:18	7/08/21 1:18	0.5	Coyote
7/08/21 1:21	7/08/21 1:23	1.25	Aircraft Flyover
7/08/21 1:25	7/08/21 1:25	0.5	Train Passby
7/08/21 1:49	7/08/21 1:50	1	Loud Vehicle Passby
7/08/21 1:55	7/08/21 1:57	2.25	Train Passby
7/08/21 1:59	7/08/21 2:05	5.75	Train Passby
7/08/21 2:18	7/08/21 2:19	0.75	Train Passby
7/08/21 2:21	7/08/21 2:23	1.5	Train Passby
7/08/21 2:23	7/08/21 2:25	1.25	Train Passby
7/08/21 2:28	7/08/21 2:30	1.5	Train Passby
7/08/21 2:44	7/08/21 2:45	1.25	Loud Vehicle Passby
7/08/21 2:49	7/08/21 2:51	2	Loud Vehicle Passby
7/08/21 3:14	7/08/21 3:15	1	Train Passby
7/08/21 3:18	7/08/21 3:19	1.25	Train Passby
7/08/21 3:27	7/08/21 3:29	2.5	Train Passby
7/08/21 3:32	7/08/21 3:33	0.75	Train Passby
7/08/21 3:47	7/08/21 3:47	0.25	Train Passby
7/08/21 3:51	7/08/21 3:52	1	Loud Vehicle Passby
7/08/21 3:55	7/08/21 3:56	1	Train Passby
7/08/21 3:58	7/08/21 3:59	1.75	Train Passby
7/08/21 4:03	7/08/21 4:04	1.25	Train Passby
7/08/21 4:04	7/08/21 4:12	8	Morning Chorus
7/08/21 4:19	7/08/21 4:20	1.25	Morning Chorus
7/08/21 4:21	7/08/21 4:23	2.75	Train Passby
7/08/21 4:24	7/08/21 4:25	1	Train Passby
7/08/21 4:26	7/08/21 4:28	2	Morning Chorus
7/08/21 4:32	7/08/21 4:32	0.75	Train Passby
7/08/21 4:41	7/08/21 4:42	1	Loud Vehicle Passby
7/08/21 4:46	7/08/21 4:47	1	Loud Vehicle Passby

#### Data Removal Noise Monitoring Location #12 (Night 1) Cont.



Start Time	End Time	Duration (min)	Reason
7/08/21 5:21	7/08/21 5:25	3.5	Morning Chorus
7/08/21 5:28	7/08/21 5:31	3.25	Morning Chorus
7/08/21 5:33	7/08/21 5:47	14	Morning Chorus
7/08/21 5:47	7/08/21 5:53	6.25	Train Passby
7/08/21 5:49	7/08/21 5:50	1.25	Train Passby
7/08/21 5:50	7/08/21 5:53	2.25	Train Passby
7/08/21 5:54	7/08/21 5:55	1.25	Loud Vehicle Passby
7/08/21 6:00	7/08/21 6:01	1.25	Loud Vehicle Passby
7/08/21 6:02	7/08/21 6:04	1.5	Loud Vehicle Passby
7/08/21 6:11	7/08/21 6:22	11.25	Morning Chorus
7/08/21 6:22	7/08/21 6:23	1	Loud Vehicle Passby
7/08/21 6:23	7/08/21 6:24	0.5	Excessive Bird Noise
7/08/21 6:25	7/08/21 6:38	13	Morning Chorus
7/08/21 6:47	7/08/21 6:49	2.75	Loud Vehicle Passby
	Total Night #1	114	
	Total Night #2	142	
	Total Data	256	

## Data Removal Noise Monitoring Location #12 (Night 1) Cont.



Start Time	End Time	Duration (min)	Reason
7/29/21 22:40	7/29/21 22:41	1	Train Passby
7/29/21 22:42	7/29/21 22:48	6	Train Passby
7/29/21 22:56	7/29/21 23:11	14.75	Train Passby
7/29/21 23:43	7/29/21 23:56	13.25	Train Passby
7/30/21 0:01	7/30/21 0:02	0.75	Animal Noise
7/30/21 0:05	7/30/21 0:07	2.25	Loud Vehicle Passby
7/30/21 0:23	7/30/21 0:29	6.75	Train Passby
7/30/21 1:03	7/30/21 1:08	5.25	Train Passby
7/30/21 1:14	7/30/21 1:17	2.25	Loud Vehicle Passby
7/30/21 1:28	7/30/21 1:31	2.75	Loud Vehicle Passby
7/30/21 1:31	7/30/21 1:32	0.75	Loud Vehicle Passby
7/30/21 1:35	7/30/21 1:38	3	Loud Vehicle Passby
7/30/21 1:41	7/30/21 1:46	5.5	Train Passby
7/30/21 1:48	7/30/21 1:51	3.75	Human Activity
7/30/21 1:53	7/30/21 1:55	1.75	Loud Vehicle Passby
7/30/21 2:02	7/30/21 2:03	1	Loud Vehicle Passby
7/30/21 2:20	7/30/21 2:21	1.75	Train Passby
7/30/21 2:22	7/30/21 2:26	3.75	Loud Vehicle Passby
7/30/21 2:35	7/30/21 2:37	2.5	Loud Vehicle Passby
7/30/21 3:02	7/30/21 3:03	1	Loud Vehicle Passby
7/30/21 3:05	7/30/21 3:06	1.5	Loud Vehicle Passby
7/30/21 3:18	7/30/21 3:26	7.75	Train Passby
7/30/21 3:35	7/30/21 3:37	1.25	Loud Vehicle Passby
7/30/21 3:53	7/30/21 3:54	1.5	Loud Vehicle Passby
7/30/21 4:12	7/30/21 4:14	1.25	Loud Vehicle Passby
7/30/21 4:27	7/30/21 4:29	1.25	Train Passby
7/30/21 4:42	7/30/21 4:46	3.75	Loud Vehicle Passby
7/30/21 4:48	7/30/21 4:50	1.25	Loud Vehicle Passby
7/30/21 4:51	7/30/21 4:56	5.5	Morning Chorus
7/30/21 4:57	7/30/21 5:02	4.5	Morning Chorus
7/30/21 5:03	7/30/21 5:09	5.75	Morning Chorus
7/30/21 5:12	7/30/21 5:19	7.25	Morning Chorus
7/30/21 5:22	7/30/21 5:27	5.25	Morning Chorus
7/30/21 5:34	7/30/21 5:36	2.5	Loud Vehicle Passby
7/30/21 5:37	7/30/21 5:42	4.75	Loud Vehicle Passby
7/30/21 5:46	7/30/21 5:47	1	Loud Vehicle Passby
7/30/21 5:49	7/30/21 5:50	1.25	Loud Vehicle Passby
7/30/21 5:53	7/30/21 5:56	2.5	Morning Chorus
7/30/21 5:57	7/30/21 5:58	0.5	Loud Vehicle Passby
7/30/21 6:01	7/30/21 6:06	4.5	Morning Chorus

## Data Removal Noise Monitoring Location #12 (Night 1)



Start Time	End Time	Duration (min)	Reason
7/30/21 6:07	7/30/21 6:07	0.25	Morning Chorus
7/30/21 6:09	7/30/21 6:10	1.25	Excessive Bird Noise
7/30/21 6:15	7/30/21 6:19	3.5	Loud Vehicle Passby
7/30/21 6:24	7/30/21 6:26	2.25	Loud Vehicle Passby
7/30/21 6:27	7/30/21 6:31	3.5	Excessive Bird Noise
7/30/21 6:32	7/30/21 6:39	7	Loud Vehicle Passby
7/30/21 6:45	7/30/21 6:47	2.5	Morning Chorus
7/30/21 6:48	7/30/21 6:51	2.75	Loud Vehicle Passby
7/30/21 6:55	7/30/21 6:58	2.75	Loud Vehicle Passby
7/30/21 22:00	7/30/21 22:02	1.5	Loud Vehicle Passby
7/30/21 22:12	7/30/21 22:13	0.75	Crickets Chirping
7/30/21 22:36	7/30/21 22:43	6.5	Train Passby
7/30/21 23:12	7/30/21 23:26	14.25	Train Passby
7/30/21 23:28	7/30/21 23:29	1.25	Train Passby
7/30/21 23:32	7/30/21 23:33	0.5	Crickets Chirping
7/30/21 23:35	7/30/21 23:54	18.5	Train Passby
7/30/21 23:55	7/30/21 23:57	2	Loud Vehicle Passby
7/30/21 23:59	7/31/21 0:02	2.75	Loud Vehicle Passby
7/31/21 0:06	7/31/21 0:08	1.75	Loud Vehicle Passby
7/31/21 0:15	7/31/21 0:15	0.5	Crickets Chirping
7/31/21 0:40	7/31/21 0:43	3.25	Train Passby
7/31/21 0:46	7/31/21 0:47	0.5	Train Passby
7/31/21 0:58	7/31/21 1:00	2	Loud Vehicle Passby
7/31/21 1:04	7/31/21 1:06	1.5	Loud Vehicle Passby
7/31/21 1:08	7/31/21 1:09	1	Loud Vehicle Passby
7/31/21 1:11	7/31/21 1:12	1.25	Loud Vehicle Passby
7/31/21 1:13	7/31/21 1:15	1.5	Loud Vehicle Passby
7/31/21 1:34	7/31/21 1:34	0.5	Crickets Chirping
7/31/21 1:35	7/31/21 1:37	1.5	Loud Vehicle Passby
7/31/21 1:48	7/31/21 1:49	1.25	Loud Vehicle Passby
7/31/21 2:05	7/31/21 2:07	1.75	Loud Vehicle Passby
7/31/21 2:15	7/31/21 2:15	0.5	Train Passby
7/31/21 3:03	7/31/21 3:03	0.5	Crickets Chirping
7/31/21 3:23	7/31/21 3:23	0.75	Loud Vehicle Passby
7/31/21 3:30	7/31/21 3:31	0.5	Crickets Chirping
7/31/21 3:34	7/31/21 3:35	1.25	Train Passby
7/31/21 3:45	7/31/21 3:45	0.75	Crickets Chirping
7/31/21 3:50	7/31/21 3:52	1.25	Train Passby
7/31/21 3:53	7/31/21 3:57	3.25	Train Passby
7/31/21 4:02	7/31/21 4:04	2	Train Passby

#### Data Removal Noise Monitoring Location #12 (Night 1) Cont.



Start Time	End Time	Duration (min)	Reason
7/31/21 4:11	7/31/21 4:19	7.25	Train Passby
7/31/21 4:32	7/31/21 4:43	11	Train Passby
7/31/21 4:48	7/31/21 4:49	0.75	Crickets Chirping
7/31/21 4:54	7/31/21 4:59	5	Crickets Chirping
7/31/21 5:01	7/31/21 5:02	1.5	Train Passby
7/31/21 5:02	7/31/21 5:04	2	Excessive Bird Noise
7/31/21 5:04	7/31/21 5:08	4	Train Passby
7/31/21 5:06	7/31/21 5:07	1	Train Passby
7/31/21 5:08	7/31/21 5:09	1.25	Excessive Bird Noise
7/31/21 5:11	7/31/21 5:15	4	Morning Chorus
7/31/21 5:18	7/31/21 5:19	1.25	Animal Noise
7/31/21 5:21	7/31/21 5:22	0.75	Train Passby
7/31/21 5:22	7/31/21 5:23	1	Coyote
7/31/21 5:36	7/31/21 5:39	3	Morning Chorus
7/31/21 5:42	7/31/21 5:43	0.5	Loud Vehicle Passby
7/31/21 5:52	7/31/21 5:55	3.75	Loud Vehicle Passby
7/31/21 6:09	7/31/21 6:12	2.5	Loud Vehicle Passby
7/31/21 6:16	7/31/21 6:19	2.25	Train Passby
7/31/21 6:28	7/31/21 6:29	1.25	Excessive Bird Noise
	Total Night #1	170	
	Total Night #2	131	
	Total Data	301	

## Data Removal Noise Monitoring Location #12 (Night 1) Cont.



Start Time	End Time	Duration (min)	Reason
7/06/21 22:00	7/06/21 22:02	2	Emergency Sirens
7/06/21 22:20	7/06/21 22:20	0.5	Animal Noise
7/06/21 22:58	7/06/21 23:00	2.75	Human Activity
7/06/21 23:02	7/06/21 23:04	2.5	Loud Vehicle Passby
7/06/21 23:22	7/06/21 23:23	0.5	Excessive Bird Noise
7/06/21 23:31	7/06/21 23:32	0.75	Excessive Bird Noise
7/07/21 1:30	7/07/21 1:31	1.25	Abnormal Noise
7/07/21 1:40	7/07/21 1:41	0.75	Abnormal Noise
7/07/21 2:15	7/07/21 2:16	0.5	Abnormal Noise
7/07/21 2:23	7/07/21 2:23	0.5	Abnormal Noise
7/07/21 2:49	7/07/21 2:51	1.75	Abnormal Noise
7/07/21 3:57	7/07/21 4:23	26.25	Morning Chorus
7/07/21 4:24	7/07/21 4:36	12.5	Morning Chorus
7/07/21 4:37	7/07/21 4:45	8.25	Morning Chorus
7/07/21 4:53	7/07/21 5:00	6.75	Morning Chorus
7/07/21 5:09	7/07/21 5:10	1	Excessive Bird Noise
7/07/21 6:03	7/07/21 6:04	1	Excessive Bird Noise
7/07/21 6:13	7/07/21 6:17	4	Loud Vehicle Passby
7/07/21 6:17	7/07/21 6:21	4.25	Excessive Bird Noise
7/07/21 22:02	7/07/21 22:04	2.25	Excessive Bird Noise
7/07/21 22:27	7/07/21 22:29	2.5	Loud Vehicle Passby
7/07/21 22:40	7/07/21 22:42	1.75	Loud Vehicle Passby
7/07/21 23:05	7/07/21 23:05	0.5	Abnormal Noise
7/08/21 2:23	7/08/21 2:29	5.25	Loud Vehicle Passby
7/08/21 2:33	7/08/21 2:34	0.5	Animal Noise
7/08/21 4:08	7/08/21 4:23	15.25	Morning Chorus
7/08/21 4:24	7/08/21 4:28	4.25	Morning Chorus
7/08/21 4:29	7/08/21 4:39	10	Morning Chorus
7/08/21 4:40	7/08/21 4:49	9.75	Morning Chorus
7/08/21 4:54	7/08/21 5:01	7	Morning Chorus
7/08/21 5:18	7/08/21 5:24	5.75	Morning Chorus
7/08/21 5:30	7/08/21 5:33	2.25	Excessive Bird Noise
7/08/21 5:38	7/08/21 5:40	2.25	Morning Chorus
7/08/21 5:52	7/08/21 5:54	2.75	Morning Chorus
7/08/21 5:57	7/08/21 5:59	1.75	Loud Vehicle Passby
	Total Night #1	78	
	Total Night #2	74	
	Total Data	152	

## **Data Removal Noise Monitoring Location #13**



# Appendix V WEATHER DATA

July 6 - 7, 2021 Weather Data

# GGI acoustical consultants inc



Monitored Wind Direction (July 6 - 7, 2021) at Noise Monitor Location 10





Monitored Humidity (July 6 - 7, 2021) at Noise Monitor Location 10





Monitored Rain Rate (July 6 - 7, 2021) at Noise Monitor Location 10





Monitored Wind Direction (July 6 - 7, 2021) at Noise Monitor Location 11





Monitored Humidity (July 6 - 7, 2021) at Noise Monitor Location 11





Monitored Rain Rate (July 6 - 7, 2021) at Noise Monitor Location 11





Monitored Wind Direction (July 6 - 7, 2021) at Noise Monitor Location 12





Monitored Humidity (July 6 - 7, 2021) at Noise Monitor Location 12





Monitored Rain Rate (July 6 - 7, 2021) at Noise Monitor Location 12



## July 7 – 8, 2021 Weather Data





Monitored Wind Direction (July 7 - 8, 2021) at Noise Monitor Location 10





Monitored Humidity (July 7 - 8, 2021) at Noise Monitor Location 10









Monitored Wind Direction (July 7 - 8, 2021) at Noise Monitor Location 11





Monitored Humidity (July 7 - 8, 2021) at Noise Monitor Location 11





Monitored Rain Rate (July 7 - 8, 2021) at Noise Monitor Location 11





Monitored Wind Direction (July 7 - 8, 2021) at Noise Monitor Location 12




Monitored Humidity (July 7 - 8, 2021) at Noise Monitor Location 12





Monitored Rain Rate (July 7 - 8, 2021) at Noise Monitor Location 12



### <u>July 29 – 30, 2021 Weather Data</u>





Monitored Wind Direction (July 29 - 30, 2021) at Noise Monitor Location 6





Monitored Humidity (July 29 - 30, 2021) at Noise Monitor Location 6





Monitored Rain Rate (July 29 - 30, 2021) at Noise Monitor Location 6





Monitored Wind Direction (July 29 - 30, 2021) at Noise Monitor Location 1





Monitored Humidity (July 29 - 30, 2021) at Noise Monitor Location 1









### Monitored Rain Rate (July 29 - 30, 2021) at Noise Monitor Location 1





Monitored Wind Direction (July 29 - 30, 2021) at Noise Monitor Location 12





Monitored Humidity (July 29 - 30, 2021) at Noise Monitor Location 12







### July 30 - 31, 2021 Weather Data





Monitored Wind Direction (July 30 - 31, 2021) at Noise Monitor Location 6





Monitored Humidity (July 30 - 31, 2021) at Noise Monitor Location 6





Monitored Rain Rate (July 30 - 31, 2021) at Noise Monitor Location 6





Monitored Wind Direction (July 30 - 31, 2021) at Noise Monitor Location 1





Monitored Humidity (July 30 - 31, 2021) at Noise Monitor Location 1





Monitored Rain Rate (July 30 - 31, 2021) at Noise Monitor Location 1





Monitored Wind Direction (July 30 - 31, 2021) at Noise Monitor Location 12





Monitored Humidity (July 30 - 31, 2021) at Noise Monitor Location 12





Monitored Rain Rate (July 30 - 31, 2021) at Noise Monitor Location 12





## **APPENDIX 2**

NCIA Member Company Noise Management Plan Updates for 2021

NCIA Northeast Capital Industrial Association	NCIA Standards and Guidelines	Document Number	03
Noise Management P per Section	Rev. Date 31-March 2016	Rev. O	

### <u>Air Liquide</u>

Note, please provide as much detail as you can for the following, attaching any clarifying or required documents with your submission. <u>This is for the calendar year 2021.</u>

If you have any questions, please call Laurie Danielson @ 780.992.1463 or 780.819.9020

Input Description	Member Site Comments
Confirmation that site has implemented a best	Signs have been posted to inform of double
management practice to address environmental	hearing protection required within plant areas.
noise as per NCIA Noise Management Plan	Annual review of Standard Operating
Standard 2010-003 issued 3-Sep-10, revised 5-	Procedures SFD/CGN-06-101 Hearing
Mar-13, revised 14-Apr-14, revised 31-Mar-16	Conservation Program to ensure compliance
including the Procedure/Practice/Standard	
reference.	
Note, if you have not provided an electronic	
copy of your site plan to NCIA, please do so.	
Provide a summary of any monitoring (fence	Noise survey conducted in Sep 2020 and
line outward completed in 2021.	provided as attached. New Generator set was
	added as peak chasing and backup electricity
Note, you are not required to conduct any off-	purpose.
site monitoring.	
	PDF
	269787 Report Noise
	Survey Air Liquid Scot
Disclose any improvements/corrective actions	Continue with Winterization with insulation on
implemented in 2021 or status thereof that	critical equipment including outside equipment.
would impact the noise level output for your	
site (either up or down).	New noise survey conducted in September
	2020 with new addition of generator set.
Did those changes result in a requirement to	
update your site noise model?	
If so, have you provided your updated site	
model to SLR Consulting for incorporation into	
the NCIA Regional Noise Model as per the	
process outlined for this purpose?	

Northeast Capital Industrial Association	NCIA Standards and Guidelines	Document Number 2010-003	
Noise Management Pl per Section	Rev. Date 31-March 2016	Rev. O	

	Mitt
Disclose any improvements/projects that are	Maintain current program.
approved for 2022 that would impact the noise	
level output for your site (either up or down).	
Will these changes result in a requirement to	
update your site noise model?	
If so, when do you anticipate having an	
updated site model available?	
Disclose any audit/self-assessment evaluation	A self-audit conducted on the Hearing
(qualitative evaluation only, with senior site	Protection and Conservative Program, Senior
leader sign-off) completed for your site noise	leader in plant reviewed this every 2 years with
management plan in 2021	no findings Attached is the Hearing
management pran in 2021.	Conservation & Protection Program
	7
	SED-CGN-06-101
	Rev2 Hearing Conserv
Provide a Noise Complaint summary for all	None in 2021
noise complainte received in 2021 including	
noise complaints received in 2021 including	
any actions taken to address them.	

This information is being collected as per the NMP Standard 2010-003 Revised 31-March-2016. All information provided will be disclosed to the AER as part of the required NCIA Annual Reporting on the Regional Noise Management Plan.

Further, the Annual Report will be a public document available on our website once finalized.

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### Scotford Complex

Reference: **SFD/CGN-06-101** Revision: 2 Date: 20 August 2018 Page: 1 of 7

Owner: Maintenance Manager

#### Hearing Conservation & Protection Program | Scotford Complex

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#### This document supersedes the following document(s):

Rev.	Date	Prepared by	Verified by	Approved by	Comments/Changes
0	01 March 2011	Steve Courchesne Maintenance Manager	Steve Courchesne Maintenance Manager	Abraham Mathew Plant Manager	Converted to CGP numbering
1	17 Oct 2013	Josie Doll Quality & IMS Facilitator	Robert Harnish Maintenance Manager	Terry Fung Plant Manager	ipdated survey maps
2	20 August 2018	Sara Stephens Quality & IMS Facilitator	Troy Ayrey Maintenance Manager	Terry Fung Plant Manager	

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Hearing Conservation & Protection Program | Scotford Complex

### 1. <u>PURPOSE AND SCOPE</u>

The purpose of this Hearing Protection Program is to ascertain that not one of the employees of the Scotford Complex is exposed to noise of such level and duration as to cause possible impairment (permanent or temporary) to his hearing while at this work place.

Scotford Complex Hearing Protection Program is the local application of requirement § 5.3 Hearing Conservation Program, of HSEQ-HEA-002 Hearing Conservation and Protection.

### 2. <u>RESPONSIBILITIES</u>

### **Plant Manager**

- · Investigate practicable options for noise control;
- Prepare, implement, review and update this program annually;
- · Supply hearing protection devices;
- · Monitor and ensure the wearing of hearing protection in all posted areas;
- · Ensure workers attend training;
- · Schedule audiometric testing and ensure workers attend audiometric testing;
- Assess new noise sources and arrange for noise measurements if changes in noise Sources.

### Employees

- · Report noise related concerns to their supervisor;
- · Participate in the Hearing Conservation and Protection program;
- · Use and care for hearing protection devices where required;
- · Participate in the hearing tests;
- · Participate in training

### Supervisors

- Bring to the attention of the Plant Manager noise related concerns reported to them by their employees;
- $\cdot$  Monitor and ensure the wearing of hearing protection in all posted areas.

### **Quality & IMS Facilitator**

· Maintain hearing protection training records

### 3. NOISE MEASUREMENTS:

### Plant Noise Survey

Sound level measurements were taken at a number of locations within the plant both indoors and outdoors.

Attached figures 1 to 4 illustrate the sound levels measured throughout the Scotford Site in the form of color-contoured noise maps. Figure 1 is a noise map of the exterior noise levels on the Scotford Site grounds and Figures 2 to 4 are noise maps of buildings where interior noise levels are displayed.

The highest noise level is inside the ASU building with noise levels registering well above 100 dB(A); the remainder of the buildings and exterior grounds registered noise levels below 100

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<b>Air Liquide</b>	Scotford Complex	Reference: <b>SFD/CGN-06-101</b> Revision: 2 Date: 20 August 2018 Page: 3 of 7 Owner: Maintenance Manager		
Hearing Conservation & Protection Program   Scotford Complex				

dB(A). The administration building's interior noise levels are not included in the figures due to the small measurement area making a noise map difficult to produce, however, the noise levels measured inside public areas of the administration building were less than 55 dB(A) on the ground floor (including the maintenance shop) and less than 50 dB(A) on the second floor.

Two isolated interior noise levels are not reported on the noise maps. Those levels are reported as follows: inside the contractor's lunch trailer a noise level of 58 dB(A) was measured and inside the CB/AR MODIN unit a level of 62 dB(A) was measured.

### Figure 1

Note that the exterior areas where noise levels are greatest are near the meters/valves underneath the pipe rack north of the scales (96dBA)and near the ASU building's west overhead door (94dBA)



### Figure 2

All measurement points located on the expander and the MAC/BAC were taken on the platforms around the equipment. The largest contributor to the overall noise levels measured inside the ASU building is the MAC/BAC. The noise level measured on the east side of the unit was 118 dB(A).

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Scotford Plant Plant Noise Su Sound Level in dB(A)

Legend

HEP File 13-1225-05 Measurement Date: July 3, 2013



### Figure 3

Note that inside the CO2 Plant, the areas where noise levels are greatest are to the north of the  $NH_3$  Compression skid and the CO<sub>2</sub> Compression Skid. Noise levels in those areas were measured at 98 dB(A) and 94 dB(A), respectively

UNIT



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Hearing Conservation & Protection Program | Scotford Complex

#### Figure 4

Note that the noise levels inside the COGEN building are greatest near the gas turbine exhaust to the HRSG Stack. The noise levels in that vicinity range from 95 dB(A) to 97 dB(A). The only exception is inside the Gas Valve Mod enclosure where a noise level of 100 dB(A) was measured.



### Exposure Level

Exposure level tests have been performed to monitor the exposure of the operators and technicians to noise. The following table describes the exposure level of typical shifts and tasks.

### NOISE EXPOSURE OF WORKERS

### Scotford site

Job name	Number of workers	Leq dB(A)	Shift duration (hours)	Lex dB( A)	Comments	OK with Regs? (Y/N)	Recommendations
ASU shift (Day & Night)	1	98	24	95	Correction to 12hr shift	Ν	Grade 3 or Class A HP; Hearing Protection and Prevention Program

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### Scotford Complex

Reference: **SFD/CGN-06-101** Revision: 2 Date: 20 August 2018 Page: 6 of 7 Owner: Maintenance Manager

### Hearing Conservation & Protection Program | Scotford Complex

Cogen day shift	1	91.8	8	93.3	Correction to 12hr shift	Ν	Grade 2 or Class B HP; Hearing Protection and Prevention Program
CWP strainer cleaning	2	92.1	1	102. 7	Correction to 9hr shift	N	Grade 4 or Class A HP; Hearing Protection and Prevention Program

### 4. EDUCATION AND TRAINING

All new employees receive information on the effects of noise on hearing, use and maintenance of hearing protection and purpose of the hearing tests during the safety orientation program.

A PowerPoint Presentation on the results of the noise survey, proper use and maintenance of hearing protection and a video on the impact of noise on hearing and hearing testing are reviewed every year with all the employees at risk.

(http://www2.worksafebc.com/Publications/Multimedia/Videos.asp?reportid=34284)

Records of training are recorded by the Quality & IMS Facilitator and kept in the employee's training file.

The audiologist performing audiometric testing will review the selection, care and use of hearing protection with each employee during the audiometric testing.

### 5. <u>HEARING PROTECTION</u>

Disposable foam earplugs and earmuffs are provided at the plant to the employees and visitors. These hearing protections are available in the Administration building.

The fit and condition of hearing protection is also checked by the audiologist mandated to perform the hearing tests.

Company policy is that hearing protection must be worn by all employees working in a noisy area (which are all posted with warning signs). Because of the high noise level (117 dB(A)), the double hearing protection is mandatory in the ASU building.

### 6. POSTING OF NOISE HAZARD AREAS

All areas with noise levels greater than 85 dB(A) have been posted with warning signs indicating hearing protection is required (Cogen and  $CO_2$  plant). Double hearing protection

### Hearing Conservation & Protection Program | Scotford Complex

signs have been posted on each door of the ASU building. These signs are checked by operation on routine inspections and replaced if necessary.

### 7. <u>HEARING TESTS</u>

As a result of the noise exposure survey, occupations with noise exposed workers have been identified (see table 1).

Baseline hearing tests are carried out within 70 days on all employees transferred and/or hired into a job where there is potential of exposure to noise levels exceeding 85 dB(A) Lex. Hearing tests are conducted every two years. We are also offering testing to workers that are not exposed to hazardous noise. The schedule for these tests is drawn up by the Plant Manager who ensures all workers attend their tests.

The results of these tests must be given to the employees. In the event copy of a worker's audiometric test is obtained, the Human Resources Department shall keep copy of the audiometric test in the worker's file, as it is medical records. All tests shall be maintained according to confidentiality principles and all applicable laws.

### 8. ANNUAL PROGRAM REVIEW

Hearing tests participation, statistics, hearing protection use trends and suggestions for improvement are reviewed annually. Any employees with Early Warning Change category receive additional coaching on the use of hearing protection.

In addition, the checklist found in Appendix A of the procedure HSEQ-HEA-002.1 Hearing Conservation and Protection Program Template is used to verify that all necessary program components have been addressed.

The records of the annual review are maintained in Intelex and the information is shared with employees during safety meetings.



# Occupational Noise Monitoring Survey

Air Liquide Scotford Plant Site

Prepared for:

# Air Liquide 55555 RR214

Fort Saskatchewan, Alberta

September 23, 2020

Pinchin File: 269787



Occupational Noise Monitoring Survey Scotford Plant Site Air Liquide

Issued to: Issued on: Pinchin file: Issuing Office: Air Liquide September 23, 2020 269787 Edmonton, AB

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#### **EXECUTIVE SUMMARY**

On September 9, 2020, Pinchin Ltd. (Pinchin) conducted a noise monitoring survey at the Air Liquide Scotford Plant Site. The objectives of the survey were to evaluate potential worker exposures to noise during representative workplace activities and to evaluate the results of testing against regulated occupational exposure limits and guidelines.

Personal samples of noise were collected on three Operators (one from each of the major plant areas) and a Maintenance staff member. The major plant areas included the Air Separation Unit (ASU), the Co-Generation power facility (Co-Gen), and the Carbon Dioxide (CO<sub>2</sub>) Plant. The results of testing indicated that three workers were over the exposure limit for noise and the fourth worker monitored was over the Action Limit of 50% of the exposure limit. All workers were noted to be using adequate hearing protection throughout the assessment and would have been protected provided a proper hearing protector seal was attained. Spot measurements for noise completed during the assessment indicated that some additional noise signage is required to meet the requirements of the Alberta Occupational Health and Safety Code. Select areas of the plant were noted to produce sound levels which would exceed the limit for the use of double hearing protection should workers spend a long enough period in the area and therefore additional administrative controls are recommended.

Recommendations are provided regarding the results:

- Until or unless engineering or administrative controls can be implemented sufficient to reduce average 8-hour noise exposures to 85 dBA or below, and in order to ensure worker exposures remain as low as reasonably achievable, mandatory use of hearing protectors should continue for all workers entering into operational areas with sound levels exceeding 85 dBA; and
- 2. In accordance with the legislation, warning signs shall be maintained at every approach to an area in the workplace where the sound level regularly exceeds 85 dBA. Signage must be added to the control valve deck area near the truck loading area (Location 20) and at the entryways to the generators (Location 16). Furthermore, noise signage indicating the need for double hearing protection should be posted at the entryways to the turbine enclosure in the Co-Gen Building to meet Air Liquide policy of having this signage in areas at or over 105 dBA. The required content of the signs is not stipulated in the Regulation, however, may include, but not be limited to:
  - Identification of actual sound level in dBA;
  - Warning of hazardous sound levels;
  - Requirement for mandatory hearing protection in the area;



- Providing the allowable exposure duration for this area, without hearing protection;
- Icons indicating that hearing protection is to be worn; and
- Other forms of controls required.
- 3. In order to ensure no worker is exposed above the allowable limits for double hearing protection of 110 dBA L<sub>ex</sub>, updates to the Air Liquide hearing conservation program should be made to ensure that administrative controls are in place to limit time spent within the ASU Building near the operating compressor. If more than one hour throughout the shift is needed, additional engineering controls must be implemented.
- 4. Periodic noise monitoring should be conducted. The results of this survey are representative of the environmental, operating and production conditions of September 9, 2020. Exposure levels will vary with changing work conditions. For this reason, periodic air monitoring should be conducted to generate personal exposure histories, monitor the efficacy of control equipment and strategies, and evaluate interday and seasonal variations in exposure levels.
- 5. In accordance with the legislation, the results of this report must be made available to workers (such as posting in a conspicuous place) in the facility and provided to the Joint Health and Safety Committee.


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## APPENDICES

APPENDIX A	RESULTS OF NOISE MONITORING
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## 1.0 INTRODUCTION

At the request of Sara Stephens, Quality Facilitator with Air Liquide, a noise monitoring survey was conducted at the Air Liquide Scotford Plant Site by Pinchin Ltd. (Pinchin). The survey was completed by Pinchin on September 9, 2020. The objectives of this survey were to evaluate potential worker exposures to noise during representative workplace conditions and to evaluate the results of testing against regulated occupational exposure limits and guidelines. This report summarizes the survey activities, the results of monitoring, and our conclusions regarding exposure potential.

### 2.0 METHODOLOGY

## 2.1 Sampling Strategy

The sampling strategy was developed by Pinchin following a review of information (i.e. facility details) provided by the Quality Facilitator of Air Liquide. The sampling strategy is summarized in Table 1.

Location	Agent Monitored	Potential Source of Exposure	Sampling and Analytical Method	Sample Description and Number of Samples
Scotford Plant Site	Noise	Machining Operations	Personal Dosimetry (as per CSA Z107.56) Direct reading instrument with Type II microphone	Three long-term personal samples on Plant Operators and one long- term sample on a Maintenance worker. Spot measurements throughout Site.

## Table 1 - Sampling Strategy of September 9, 2020

Four long-term personal noise measurements were collected from workers to determine average exposures throughout the Facility. Exposures were measured in units of decibels on the A-weighted scale (dBA). Workers were asked to wear a Quest Electronics noise dosimeter for a representative portion of their workday. In accordance with regulatory requirements, the noise dosimeters were set to the following parameters:

A-weighting th	threshold level feature turned of
----------------	-----------------------------------

3 dBA exchange rate

85 dBA criterion level

In conformance with Canadian Standards Assocation (CSA) Standard Z107.56 – "Measurement of Noise Exposure", sequential measurements were taken from workers where possible, that is, at least two separate measurements were taken from most workers monitored (first and second half of shift). Following the measurement period, the A-weighted sound pressure level (i.e. the personal exposure measured in dBA) was read directly from the noise dosimeter.



Additional short-term noise measurements were collected using a 3M Sound Examiner SE-402, handheld Type 2 integrating sound level meter. Measurements were taken at specific locations to identify predominant noise sources and to identify areas where noise levels regularly exceed 85 dBA.

All noise monitoring equipment was calibrated before and after the survey.

## 3.0 OCCUPATIONAL EXPOSURE LIMITS/GUIDELINES

The results of testing were evaluated against the occupational exposure limit set in the *Occupational Health and Safety Code, Part 16, Section 218.* The Regulation states that the employer shall ensure that no worker is exposed to an equivalent 8-hour average noise level (L<sub>ex</sub>) above 85 dBA. It should be noted that exposures exceeding 85 dBA during the workday are permitted, provided that the L<sub>ex</sub> does not exceed 85 dBA.

Where average personal exposures exceed 85 dBA L<sub>ex</sub>, *Section 221 and 222* states that protective measures must be implemented. These measures may include engineering controls, administrative controls (e.g. reducing a worker's exposure time through worker rotation) and use of personal protective equipment (PPE).

*Section 221* states that a clearly visible warning sign shall be placed any area where the noise level exceeds 85 dBA.

## 4.0 RESULTS AND CONCLUSIONS

### 4.1 Summary of Site Activities

The survey was performed during typical day shift operating and environmental conditions. The work activities/conditions, as reported by the workers involved in the survey, are presented in Table 2. It was reported that the shift for workers at Air Liquide Scotford was eight hours in duration.

### 4.2 Field Observations

The following field observations were made by the Pinchin hygienist during the survey:

- There are three primary areas of the site: The Air Separation Unit (ASU) building, the Co-Generation power facility (Co-Gen), and the Carbon Dioxide (CO<sub>2</sub>) Plant;
- Site required personal protective equipment (PPE) includes hard hats, safety glasses, steel toed boots, and personal gas monitoring equipment (type depends on which building areas entered);
- Hearing protection is required for entry into most process areas, with double hearing protection required if entering the ASU building;



- There is a hearing conservation Code of Practice for the site;
- Signage indicating the need for hearing protection was noted to be posted on the entry to most areas with elevated noise levels; and
- The following foam plugs are available to all workers within the Administration building near the permitting desk area: "Howard Leight Laser Lite" (CSA Class AL) and "Howard Leight Max Lite" (CSA Class AL). Workers were noted to also have hard hat mounted earmuffs (CSA Class A).

Table 2 -	Summary	of	Worker	Activities
-----------	---------	----	--------	------------

Job Function	Work Tasks	Task Frequency and Duration	Controls Utilized
Operator	Operators are primarily responsible for performing rounds of their respective work areas (ASU, Co-Gen, or CO <sub>2</sub> Plant) to ensure that equipment is performing properly and trouble shooting issues within the Plant. Workers perform administrative duties within office areas and run sample analysis within lab spaces as well.	Throughout shift	Standard PPE Single CSA Class A hearing protection in most process buildings and double hearing protection in the
Maintenance	Performs maintenance on various processes. Tasks take them into most areas of the plant throughout the day. Throughout morning of the shift the Maintenance worker was within the ASU building. Throughout the afternoon of the shift, the worker was outside of the Co-Gen plant.		ASU Building.

### 4.3 Noise Monitoring

The personal noise monitoring results are presented in Table A1 of Appendix A. The results of personal noise monitoring are presented as "Average Noise Levels" (as measured over the monitoring periods), and "8-Hour Equivalent Noise Level" (L<sub>ex</sub>) Exposures. The 8-hour L<sub>ex</sub> exposure averages the multiple noise measurements taken from a worker.

The results indicated the following:

- Three of the four 8-hour average exposures exceeded the 85 dBA exposure limit;
- The CO<sub>2</sub> Plant Operator was the only worker who did not exceed the exposure limit. However, this worker did exceed the Action Limit of 50% of the exposure limit (82 dBA);
- All workers monitored were wearing adequate levels of hearing protection and would have been protected assuming a proper hearing protector seal was attained; and

• The highest exposures were measured on the Maintenance worker and associated with their time spent in the first half of the shift within the ASU Building near the operating compressor unit (spot measurements reached 118 dBA in this area).

The results of short-term area noise monitoring are presented in Table A2 of Appendix A. A sound level map is also provided in Appendix A. The results indicate the following:

- Multiple areas of the facility had noise levels that would regularly exceed 85 dBA. Most of the areas are already included in a signage program, however, the control valve deck area near the truck loading area (Location 20) and at the entryways to the generators (Location 16) were noted to not have the required noise warning signage. Furthermore, noise signage indicating the need for double hearing protection should be posted at the entryways to the turbine enclosure in the Co-Gen Building to meet Air Liquide policy of having this signage in areas at or over 105 dBA; and
- The area near the operating compressor unit in the North East corner of the ASU Building had noise levels which exceeded the limit for double hearing protection of 110 dBA for eight hours (levels were between 115 to 118 dBA). At these levels, additional controls to limit time spent within the area are required. At 116 dBA, a worker would be able to spend up to two hours within the area with double hearing protection. At 119 dBA, a worker would be able to spend up to one hour within the area with double hearing protection. Based on discussions with staff at the Scotford Plant site, it is unlikely that workers would spend more than an hour of the shift in proximity to the operating compressor unit in the ASU building. However, in order to ensure no worker is exposed above the allowable limits for double hearing protection of 110 dBA L<sub>ex</sub>, updates to the Air Liquide hearing conservation program should be made to ensure that administrative controls are in place to limit time spent within the ASU Building near the operating compressor. If more than one hour throughout the shift is needed, additional controls must be implemented.

## 5.0 RECOMMENDATIONS

The following recommendations are provided:

 Until or unless engineering or administrative controls can be implemented sufficient to reduce average 8-hour noise exposures to 85 dBA or below, and in order to ensure worker exposures remain as low as reasonably achievable, mandatory use of hearing protectors should continue for all workers entering into operational areas with sound levels exceeding 85 dBA; and

- 2. In accordance with the legislation, warning signs shall be maintained at every approach to an area in the workplace where the sound level regularly exceeds 85 dBA. Signage must be added to the control valve deck area near the truck loading area (location 20) and at the entryways to the generators (location 16). Furthermore, noise signage indicating the need for double hearing protection should be posted at the entryways to the turbine enclosure in the Co-Gen Building to meet Air Liquide policy of having this signage in areas at or over 105 dBA. The required content of the signs is not stipulated in the Regulation, however, may include, but not be limited to:
  - Identification of actual sound level in dBA;
  - Warning of hazardous sound levels;
  - Requirement for mandatory hearing protection in the area;
  - Providing the allowable exposure duration for this area, without hearing protection;
  - Icons indicating that hearing protection is to be worn; and
  - Other forms of controls required.
- 3. In order to ensure no worker is exposed above the allowable limits for double hearing protection of 110 dBA L<sub>ex</sub>, updates to the Air Liquide hearing conservation program should be made to ensure that administrative controls are in place to limit time spent within the ASU Building near the operating compressor. If more than one hour throughout the shift is needed, additional engineering controls must be implemented.
- 4. Periodic noise monitoring should be conducted. The results of this survey are representative of the environmental, operating and production conditions of September 9, 2020. Exposure levels will vary with changing work conditions. For this reason, periodic air monitoring should be conducted to generate personal exposure histories, monitor the efficacy of control equipment and strategies, and evaluate interday and seasonal variations in exposure levels.
- 5. In accordance with the legislation, the results of this report must be made available to workers (such as posting in a conspicuous place) in the facility and provided to the Joint Health and Safety Committee.



## 6.0 **REFERENCES**

- Alberta Occupational Health and Safety Act, http://www.qp.alberta.ca/1266.cfm?page=O02.cfm&leg\_type=Acts&isbncln=0779749200
- 2. Alberta Occupational Health & Safety Regulation 62/2003, http://www.qp.alberta.ca/1266.cfm?page=2003\_062.cfm&leg\_type=Regs&isbncln=07797 1752X
- 3. Alberta Occupational Health & Safety Code 2009, http://work.alberta.ca/documents/WHS-LEG\_ohsc\_2009.pdf
- 4. CSA Standard Z107.56-13 "Measurement of Noise Exposure".
- CSA Standard Z94.2-14 (Revised May 2015) "Hearing Protection Devices Performance, Selection, Care, and Use".

## 7.0 TERMS AND LIMITATIONS

This work was performed subject to the Terms and Limitations presented or referenced in the proposal for this project.

Information provided by Pinchin is intended for Client use only. Pinchin will not provide results or information to any party unless disclosure by Pinchin is required by law. Any use by a third party of reports or documents authored by Pinchin or any reliance by a third party on or decisions made by a third party based on the findings described in said documents, is the sole responsibility of such third parties. Pinchin accepts no responsibility for damages suffered by any third party as a result of decisions made or actions conducted. No other warranties are implied or expressed.

### 8.0 CLOSURE

Pinchin would like to express our appreciation to the workers of Air Liquide who were involved with or participated in this survey. If you or the Joint Health and Safety Committee require additional information on this report, or other matters, please do not hesitate to call.

\FSEDM\Job\269000s\0269787.000 Air Liquide,OHS,Noise,Scotford\Deliverables\269787 Report Noise Survey Air Liquid Scotford Sep 23 2020.docx Template: Alberta Occupational Hygiene Survey Report, OHS, April 8, 2019

APPENDIX A Results of Noise Monitoring September 9, 2020



	(minutes)	Noise Level (dBA)	8-Hour L <sub>ex</sub> Exposure (dBA)
SU Operator earing protection worn (CSA Class A Earmuffs)	8:20 am to 12:02 pm 12:02 pm to 2:59 pm (399)	95.0 95.1	95.0
D <sub>2</sub> Plant Operator earing protection worn (CSA Class A)	8:42 am to 12:06 pm 12:06 pm to 2:40 pm (358)	83.7 82.9	83.4
o-Gen Operator earing protection worn (CSA Class A)	8:30 am to 3:15 pm (405)	88.9	88.9
aintenance earing protection worn (CSA Class A Earmuffs)	8:20 am to 11:44 am 11:44 am to 3:00 pm (400)	102.0 77.6	99.1
aint eari Ear	enance ng protection worn (CSA Class A muffs) 85 dBA L <sub>ex</sub>	enance8:20 am to 11:44 amng protection worn (CSA Class A muffs)11:44 am to 3:00 pm (400)85 dBA Lex	enance8:20 am to 11:44 am102.0ng protection worn (CSA Class A muffs)11:44 am to 3:00 pm77.6(400)85 dBA Lex85 dBA Lex102.0

## Table A1 - Results of Long-Term Personal Noise Monitoring on September 9, 2020

Notes: The 8-hour  $L_{ex}$  Exposure (equivalent noise exposure) was calculated based on 8-hour workday. dBA: decibels measured on the A-weighted scale



Sample Number	Measurement Description	Range of Sound Pressure Levels (dBA)
1	Outside Administration Building	77 to 78
2	Outside Entry to ASU	90 to 91
3	Parking Lot Area	70 to 71
4	Substation Entry Area	65 to 66
5	Between Substation and Co-Gen Area	70 to 71
6	Between CO <sub>2</sub> Building and Administration Building	70 to 71
7	Co-Gen Building – South quadrant	88 to 89
8	Co-Gen Building – West quadrant	82 to 85
9	Co-Gen Building – North quadrant	87 to 94
10	Co-Gen Building – Center area	90 to 91
11	Co-Gen Building – North East	90 to 91
12	Co-Gen Building – South East	91 to 92
13	Co-Gen – Inside turbine enclosure	105 to 107
14	Co-Gen – Maintenance Shop Area	63 to 64
15	Generator Area – Generators on, measurements collected outside of the units throughout the area	77 to 79
16	Generator Area – Within generator units	106 to 107
17	Quonset Hut Area	70 to 75
18	Outside Co-Gen near Heat Exchanger	81 to 84
19	Outside Co-Gen near equipment at west side of building	71 to 77
20	Control valve deck area located near trucking area	91 to 92
21	CO <sub>2</sub> Bullet Area	77 to 78
22	Truck Loading Area	75 to 77
23	O2 and Argon Gas Storage Tank Area	65 to 66
24	O <sub>2</sub> Pipeline Bunker Area	78 to 80

## Table A2 - Results of Short-Term Area Noise Monitoring on September 9, 2020



Sample Number	Measurement Description	Range of Sound Pressure Levels (dBA)		
25	ASU – North East near compressor units	115 to 118		
26	ASU – South East	104 to 105		
27	ASU - Center	106 to 107		
28	ASU – West End	100 to 101		
29	Outside ASU near Cooling Tower	78 to 80		
30	South of ASU and Cooling Tower	72 to 74		
31	West of ASU	72 to 73		
32	CO2 Building – Central area near motor unit	93 to 95		
33	CO2 Building – Throughout walkways around the building	83 to 89		
34	CO2 Building – North East area near motor unit	91 to 92		
Signage requirement limit:		85 dBA		
Notes: Range of Sound Pressure Levels represents minimum and maximum values recorded.				

FIGURES





Northeast Capital Industrial Association	NCIA Standards and Guidelines	Document Number	03
Noise Management P per Section	Rev. Date 31-March 2016	Rev. 0	

## Aux Sable Canada:

Note, please provide as much detail as you can for the following, attaching any clarifying or required documents with your submission. <u>This is for the calendar year 2021.</u>

Input Description	Member Site Comments
Confirmation that site has implemented a best management practice to address environmental noise as per NCIA Noise Management Plan Standard 2010-003 issued 3-Sep-10, revised 5- Mar-13, revised 14-Apr-14, revised 31-Mar-16 including the Procedure/Practice/Standard reference.	The site has implemented best practice management to address environmental noise as per the NCIA NMP Standard.
Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.	
Provide a summary of any monitoring (fence line outward completed in 2021.	No noise monitoring conducted in 2021. No equipment changes, process changes or external reports to drive a 2021 noise study.
Note, you are not required to conduct any off- site monitoring.	
Disclose any improvements/corrective actions implemented in 2021 or status thereof that would impact the noise level output for your site (either up or down).	No improvements or corrective actions completed in 2021 to alter the site's noise level output.
Did those changes result in a requirement to update your site noise model?	N/A
If so, have you provided your updated site model to SLR Consulting for incorporation into the NCIA Regional Noise Model as per the process outlined for this purpose?	

Northeast Capital Industrial Association	NCIA Standards and Guidelines	Document Number	03
Noise Management P per Section	Rev. Date 31-March 2016	Rev. O	

Disclose any improvements/projects that are approved for 2022 that would impact the noise level output for your site (either up or down).	There are no current improvements/projects approved for 2022 that would impact the site's noise level output.
Will these changes result in a requirement to update your site noise model?	N/A
If so, when do you anticipate having an updated site model available?	
Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan in 2021.	Site personnel noise dosimetry testing completed. Dosimetry testing includes location data with noise levels are frequencies. No significant changes identified from the 2021 study.
Provide a Noise Complaint summary for all	No noise complaints received in 2021.
noise complaints received in 2021 including	_
any actions taken to address them.	

Northeast Capital Industrial Association	NCIA Standards and Guidelines	Document Number	03
Noise Management Plan Reporting Requirements as per Section 5.4 of this Standard		Rev. Date 31-March 2016	Rev. 0

## Bunge Canada:

Note, please provide as much detail as you can for the following, attaching any clarifying or required documents with your submission. <u>This is for the calendar year 2021.</u>

Input Description	Member Site Comments
Confirmation that site has implemented a best	A third-party consultant performed the noise
management practice to address environmental	level measurements at the facility in the past.
noise as per NCIA Noise Management Plan	Facility currently does not have a formal Noise
Standard 2010-003 issued 3-Sep-10, revised 5-	Management Plan.
Mar-13, revised 14-Apr-14, revised 31-Mar-16	
including the Procedure/Practice/Standard	
reference.	
Note, if you have not provided an electronic	
copy of your site plan to NCIA, please do so.	XY 1 . 1
Provide a summary of any monitoring (fence	None conducted.
line outward completed in 2021.	
Note, you are not required to conduct any off-	
site monitoring.	
Disclose any improvements/corrective actions	None implemented.
implemented in 2021 or status thereof that	
site (aither up or down)	
she (enner up or down).	
Did those changes result in a requirement to	
undate your site noise model?	
update your site noise model.	
If so, have you provided your updated site	
model to SLR Consulting for incorporation into	
the NCIA Regional Noise Model as per the	
process outlined for this purpose?	

Northeast Capital Industrial Association	NCIA Standards and Guidelines	Document Number	03
Noise Management Plan Reporting Requirements as per Section 5.4 of this Standard		Rev. Date 31-March 2016	Rev. 0

Disclose any improvements/projects that are approved for 2022 that would impact the noise level output for your site (either up or down). Will these changes result in a requirement to update your site noise model? If so, when do you anticipate having an updated site model available?	None planned.
Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan in 2021.	None completed.
Provide a Noise Complaint summary for all noise complaints received in 2021 including any actions taken to address them.	None received.

Northeast Capital Industrial Association	NCIA Standards and Guidelines	Document Number	03
Noise Management Plan Reporting Requirements as per Section 5.4 of this Standard		Rev. Date 31-March 2016	Rev. O

## Cenovus Bruderheim Energy Terminal

Note, please provide as much detail as you can for the following, attaching any clarifying or required documents with your submission. <u>This is for the calendar year 2021.</u>

Member Site Comments
As per our 2019 response companywide
Cenovus manages noise through an internal
"Hearing Conservation Practice. The hearing
conservation program has the following
elements:
1. Worker education and training
2. Facility Noise Survey
3. Personal Exposure assessment
4. Noise control strategies
5. Audiometric testing
6. Annual review of program
Roles and responsibilities are clearly defined in
the practice as well as training and records
management.
Given the size of the Brudereheim Energy
Terminal we believe the Cenovus internal
practice documents are sufficient to meet the
requirements of the NCIA Standards and
Guideline document for a noise management
plan.
No exterior to the facility noise monitoring
completed in 2021.
No significant changes to operation of the
terminal in 2021. Note in 2019 the noise
model was updated as part of the ficensing of
an injection building at the eastern (Mannest)

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Disclose any improvements/projects that are approved for 2021 that would impact the noise level output for your site (either up or down).	No significant improvements/projects were completed in 2021
Will these changes result in a requirement to update your site noise model?	No
If so, when do you anticipate having an updated site model available?	Site model not updated in 2021
Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan in 2020.	In 2021 no audit/self-assessment completed. Site noise survey for operator exposure was completed in May 2019
Provide a Noise Complaint summary for all noise complaints received in 2020 including any actions taken to address them.	No noise complaints in 2021.

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## Insert your Company Name here: Chemtrade 2021

Note, please provide as much detail as you can for the following, attaching any clarifying or required documents with your submission. This is for the calendar year 2021.

Input Description	Member Site Comments
Confirmation that site has implemented a best management practice to address environmental noise as per NCIA Noise Management Plan Standard 2010-003 issued 3-Sep-10, revised 5- Mar-13, revised 14-Apr-14, revised 31-Mar-16 including the Procedure/Practice/Standard reference.	All equipment that produce noise above 85db are placed in buildings to reduce noise and to provide a safe working area.
Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.	
Provide a summary of any monitoring (fence line outward completed in 2020.	No monitoring was done at the site level
Note, you are not required to conduct any off- site monitoring.	
Disclose any improvements/corrective actions implemented in 2020 or status thereof that would impact the noise level output for your site (either up or down).	No changers were implemented
Did those changes result in a requirement to update your site noise model?	
If so, have you provided your updated site model to SLR Consulting for incorporation into the NCIA Regional Noise Model as per the process outlined for this purpose?	

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Disclose any improvements/projects that are approved for 2021 that would impact the noise level output for your site (either up or down).	No major improvements were made or equipment purchased that would have an impact.
Will these changes result in a requirement to update your site noise model?	
If so, when do you anticipate having an updated site model available?	
Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan in 2020.	Routine internal audits are carried.
Provide a Noise Complaint summary for all noise complaints received in 2020 including any actions taken to address them.	No complaints were received.

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## **Conifer Energy Inc.:**

Note, please provide as much detail as you can for the following, attaching any clarifying or required documents with your submission. <u>This is for the calendar year 2021.</u>

Input Description	Member Site Comments
Confirmation that site has implemented a best management practice to address environmental noise as per NCIA Noise Management Plan Standard 2010-003 issued 3-Sep-10, revised 5- Mar-13, revised 14-Apr-14, revised 31-Mar-16 including the Procedure/Practice/Standard reference.	Best management practice in draft for internal review. Will forward final issued practice document when available.
Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.	
Provide a summary of any monitoring (fence line outward completed in 2021. Note, you are not required to conduct any off-	None completed in 2021
site monitoring.	
<ul> <li>Disclose any improvements/corrective actions implemented in 2021 or status thereof that would impact the noise level output for your site (either up or down).</li> <li>Did those changes result in a requirement to update your site noise model?</li> <li>If so, have you provided your updated site model to SLR Consulting for incorporation into the NCIA Regional Noise Model as per the process outlined for this purpose?</li> </ul>	Commenced demolition of decommissioned portion of the Redwater Gas Plant in October, 2021. Demolition completed in April 2022. Will evaluate need to update noise model for the site given the deletion of several existing structures that may have provided some noise attenuation.

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Disclose any improvements/projects that are approved for 2022 that would impact the noise level output for your site (either up or down). Will these changes result in a requirement to update your site noise model?	No facility changes or additions planned
If so, when do you anticipate having an updated site model available?	
Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan in 2021.	None completed as management practice not yet implemented
Provide a Noise Complaint summary for all noise complaints received in 2021 including any actions taken to address them.	No noise complaints received in 2021



June 22, 2022

Northeast Capital Industrial Association Laurie Danielson, Executive Director #204, 9902 - 102 Street Fort Saskatchewan, AB T8L 2C3

Dear Dr. Danielson,

## Subject: 2021 Regional Noise Management Annual Report Dow Chemical Canada ULC (Dow) Fort Saskatchewan Site

Please find attached Dow Chemical Canada ULC (Dow) input into the NCIA Regional Noise Management Plan report to the Alberta Energy Regulator (AER) for the Dow Fort Saskatchewan Industrial Site. MEGlobal Canada ULC (MEGlobal) operates a production facility within the Dow Site and is included in this submission.

Please call Stephanie Kozey at 780 - 992 - 4408 or me at 780 - 992 - 2835 if you require any further information or clarification.

Yours truly,

Stacey Heidbrink

Stacey Heidbrink Responsible Care Director Dow Alberta Operations

Copy: Andrew Maile, Responsible Care Leader MEGlobal Canada ULC

## Dow Fort Saskatchewan Site 2021 Regional Noise Management Annual Report Prepared for Northeast Capital Industrial Association (NCIA)

This report provides Dow and MEGlobal's 2021 input to the NCIA Regional Noise Management Plan report to be submitted to the AER. Based on AER licensed assets on the Fort Saskatchewan Site, Dow is required to follow AER Noise Directive 38 and provide input into the NCIA report. The Dow power plant is governed by the Alberta Utilities Commission Rule 012: Noise Control. MEGlobal participates in the Noise Management Plan and provides this information on a voluntary basis.

Input Description	Member Site Comments
Confirmation that site has implemented a best	A Noise Management Plan was developed by
management practice to address	Dow and MEGlobal for submission to NCIA
environmental noise as per NCIA Noise	for inclusion in the 2021 NCIA report to the
Management Plan Standard 2010-003 issued	AER. A copy of the most recent version is
3-Sep-10, revised 5-Mar-13, revised 14-Apr-	included with this report.
14, revised 31-Mar-16 including the	Noise management is done on a site wide
Procedure/Practice/Standard reference.	basis without separation of which facilities
	are required to follow AER Directive 38 and
Note, if you have not provided an electronic	AUC Rule 012.
copy of your site plan to NCIA, please do so.	
Provide a summary of any monitoring (fence	No noise monitoring (fenceline outward) was
line outward completed in 2021.	completed in 2021. The site noise model was
	updated in 2014 for all sources (other than
Note, you are not required to conduct any off-	onsite transportation) within the Dow Fort
site monitoring.	Saskatchewan Site, including MEGlobal.
	Recent updates to the Dow site model have
	been incorporated into the NCIA regional
	noise model.
Disclose any improvements/corrective actions	There were no improvements/corrective
implemented in 2021 or status thereof that	actions implemented in 2021 at MEGlobal
would impact the noise level output for your	plants.
site (either up or down).	
<b></b>	Dow started up a new ethylene cracking
Did those changes result in a requirement to	furnace, H-091, on April 13, 2021. This new
update your site noise model?	cracking furnace will be included in our next
	site noise model update. There were no other
If so, have you provided your updated site	improvement/corrective action implemented
model to SLR Consulting for incorporation	in 2021 at Dow plants.
the process outlined for this purpose?	
the process outlined for this purpose?	

Disclose any improvements/projects that are approved for 2022 that would impact the noise level output for your site (either up or	There were no improvements/corrective actions approved for 2022 at either Dow or MEGlobal plants.
down).	L L
update your site noise model?	
If so, when do you anticipate having an updated site model available?	
Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan in 2021.	The Noise Management Plan falls within the Pollution Prevention section of Dow and MEGlobal's Operating Discipline Management System (ODMS). A site management system review was most recently conducted in December 2020 by the site leader. No actions or gaps were identified related to the Noise Management Plan. No additional noise self-assessments were completed in 2021.
Provide a Noise Complaint summary for all noise complaints received in 2021 including any actions taken to address them.	There were no noise complaints related to Dow or MEGlobal operations at the site in 2021.

# Dow Fort Saskatchewan Site Noise Management Plan

Policy	The Dow Chemical Canada ULC Fort Saskatchewan site follows the Operating Discipline Management System (ODMS) of the Dow Chemical Company to manage environmental noise and hearing conservation.
	MEGlobal Canada ULC (MEGlobal) Operations on the Dow Fort Saskatchewan Site follows the EQUATE Chemical Company ODMS and is included in this Noise Management Plan.
Scope	This document is created to define how the Dow Chemical Canada ULC Fort Saskatchewan site complies with the ODMS requirements concerning Noise Minimization and Hearing Conservation outlined in:
	<ul> <li>Section E (noise minimization to meet community expectations and applicable government requirements) of <u>06.07 L1 Pollution Prevention</u></li> <li>Section C14 (employee hearing conservation) of <u>06.05 L1 Employee Health and Safety</u></li> <li>Section A2 (all equipment must be designed to control noise levels) of <u>06.03 EH&amp;S Engineering Design and Control</u></li> </ul>
Purpose	This document summarizes how the Dow Fort Saskatchewan Site meets the Northeast Capital Industrial Association (NCIA) requirement for a Noise Management Plan including identification, evaluation and control of noise impacts at this site.
	This Noise Management Plan meets the requirements of NCIA Standard and Guideline #2010-003, as amended.
	Based on AER licensed assets on the Fort Saskatchewan Site, Dow is required to follow AER Noise Directive 38 and provide input into the NCIA report. The Dow power plant is governed by the Alberta Utilities Commission Rule 012: Noise Control.
Goals /	Dow and MEGlobal, as Responsible Care® Companies will:
Objectives	<ul> <li>Minimize, to the extent possible, noise levels impacting on the environment including minimizing nighttime and low frequency noise</li> <li>Maintain a noise monitoring program to reduce the likelihood of noise impacts on the environment</li> </ul>
	<ul> <li>Assignt employees to manage the site hoise monitoring, mitigation and continuous improvement.</li> <li>Ensure employees associated with noise sources are aware of the impact on the environment and the processes in place to control</li> <li>Design new and modified equipment to minimize noise.</li> </ul>
Training	Workers are educated on noise through:
Requirements	<ul> <li>All workers receive initial and three year recurring Environmental Training (Instructor led or online), which includes environmental noise.</li> <li>Noise exposed workers receive training on hearing conservation.</li> <li>Personnel conducting noise monitoring receive training from the Industrial Hygiene specialists.</li> <li>Personnel delivering unit industrial hygiene programs receive training on these programs.</li> <li>Training is tracked in a corporate web based system.</li> </ul>

Abatement Strategies	New facilities and modifications to existing facilities are designed and built to control noise levels. Engineering controls are addressed through the Management of Change process and ODMS 06.03 EH&S Design and Control.
	All projects are reviewed by EH&S regulatory personnel opposite the <u>Alberta</u> <u>Operations Project Regulatory Review Checklist</u> , which includes noise abatement and models. The Dow Management of Change system includes a similar review for changes to site facilities.
Onsite / Offsite Monitoring Requirements	Dow and MEGlobal follow ODMS and AER regulatory requirements for noise monitoring on site. Offsite noise monitoring is addressed through the NCIA regional noise model.
	Dow has a current <u>Noise Model</u> prepared by SLR Consulting Ltd. which includes all significant site sources within the fenceline other than on-site transportation sources. The site noise model is updated if equipment is added or removed from the site that would significantly impact noise levels.
	The regional noise model is validated periodically by NCIA. If any discrepancies are noted during NCIA field validation related to the Dow site, Dow will work toward resolving the discrepancy and may validate the Dow noise model with field measurements if required.
	Dow responds to external noise complaints appropriately, including monitoring if necessary.
	Dispatch Noise Complaint Procedure EH&S On-Call Noise Complaint Logsheet
	Individual production units do their own noise surveys at least every five years, or when equipment is added, modified or removed.
	The onsite noise monitoring program is managed as per in ODMS 06.05.C14
	Personal noise dosimetry is done periodically on a frequency depending on exposure.
Site Noise Sources	Site noise sources are detailed in the site <u>Noise Model</u> and included in the NCIA regional noise model. In addition, each unit has an area <u>noise map</u> .
Audit / Self Assessment Requirements	Intensive EH&S ODMS based integrated audits are conducted at 3 to 5 year frequencies for all site units/departments and include ODMS elements related to noise and hearing conservation.
	Periodic self-assessments are conducted by unit/department ODMS element owners and results are reviewed with leaders at unit and department management system reviews. Results of unit, department and site self-assessments are reviewed by the Site Leader at the annual site management system review. These self-assessments include environmental noise and hearing conservation.
	The hearing conservation program is designed to minimize job induced hearing loss and meets the Alberta OH&S Code as well as Dow corporate requirements for a noise exposure and control program. This program is reviewed annually.
	This Noise Management Plan is reviewed once per year by the Responsible Care Leader.

Reporting Requirements	Annual reports will be generated for the NCIA. This report will include the following information for the calendar year:
	<ul> <li>Confirmation that the site has implemented a Noise Management Program and that it has been reviewed/updated as required.</li> <li>Results of any monitoring / assessments (fenceline outward)</li> <li>Improvements/Corrective Actions implemented</li> <li>Improvement / projects that have resulted in changed noise levels on the site</li> <li>Audit/Self-Assessment evaluation</li> <li>Information on any external noise complaints received and actions taken</li> </ul>
Ownership	The AER Regulatory Specialist manages the Noise Management Program and reports to NCIA as required.

## **Revision History**

Approval	Approved by
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Date: January 2012

Carol Moen (Dow Responsible Care Leader)

Pravind Ramdial (MEGlobal Responsible Care Leader)

Review History The following documents the review history for this file.

Date	<b>Reviewed By</b>	Position
April 2013	Mike Dziarmaga	Dow Responsible Care Leader
May 2014	Mike Dziarmaga	Dow Responsible Care Leader
August 2015	Mike Dziarmaga	Dow Responsible Care Leader
June 2016	Mike Dziarmaga	Dow Responsible Care Leader
June 2017	Jacint Domenech	Dow Responsible Care Leader
October 2018	Jacint Domenech	Dow Responsible Care Leader
October 2019	Jacint Domenech	Dow Responsible Care Leader
July 2020	Stephen Tong	Dow Responsible Care Leader
August 2021	Stephen Tong	Dow Responsible Care Leader

### Revision History

The following information documents at least the last 3 changes to this document, with all the changes listed for the last 6 months.

Date	Revised By	Changes
January 2012	Marcella deJong	New document.
April 2013	Marcella deJong	Updated Reporting Requirements to match with updated NCIA NMP Standard dated 5-Mar-13.
May 2014	Marcella deJong	Updated with clarifications suggested during AER audit of the Noise Management Plan and to meet the current NCIA standard revised in April 2014.
May 2016	Marcella deJong	Updated MEGlobal Canada Inc. to MEGlobal Canada ULC. Updated HFP to SLR.
June 2017	Marcella deJong	Replaced "MyLearning" with "online".
October 2018	Marcella deJong	Updated Broken Links
July 2020	Marcella deJong	Updated Broken Links

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## Insert your Company Name here: Enbridge Pipelines (Athabasca) Inc.

Note, please provide as much detail as you can for the following, attaching any clarifying or required documents with your submission. This is for the calendar year 2021.

Input Description	Member Site Comments
Confirmation that site has implemented a best management practice to address environmental noise as per NCIA Noise Management Plan Standard 2010-003 issued 3-Sep-10, revised 5- Mar-13, revised 14-Apr-14, revised 31-Mar-16 including the Procedure/Practice/Standard reference.	Enbridge has implemented a best management practice to address environmental noise as per the NCIA Noise Management Plan.
Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.	
Provide a summary of any monitoring (fence line outward completed in 2021.	No offsite monitoring was conducted in 2021.
Note, you are not required to conduct any off- site monitoring.	
Disclose any improvements/corrective actions implemented in 2021 or status thereof that would impact the noise level output for your site (either up or down). Did those changes result in a requirement to update your site noise model?	No improvements/corrective actions were implemented in 2021 that would impact the noise level output.
If so, have you provided your updated site model to SLR Consulting for incorporation into the NCIA Regional Noise Model as per the process outlined for this purpose?	

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Disclose any improvements/projects that are approved for 2022 that would impact the noise level output for your site (either up or down). Will these changes result in a requirement to update your site noise model?	Construction of a new storage tent is planned for July 2022, noise may increase slightly at this time due to the construction activities. No changes to site noise modeling is anticipated.
If so, when do you anticipate having an updated site model available?	
Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan in 2021.	No audit/self-assessment evaluation was completed in 2021.
Provide a Noise Complaint summary for all noise complaints received in 2021 including any actions taken to address them.	No noise complaints were received in 2021.

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## Evonik Canada Inc.

Note, please provide as much detail as you can for the following, attaching any clarifying or required documents with your submission. This is for the calendar year 2021.

Input Description	Member Site Comments
Confirmation that site has implemented a best management practice to address environmental noise as per NCIA Noise Management Plan Standard 2010-003 issued 3-Sep-10, revised 5- Mar-13, revised 14-Apr-14, revised 31-Mar-16 including the Procedure/Practice/Standard reference.	Confirmed. Relevant Evonik site policy was provided in 2014 and has remained unchanged since then.
Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.	
Provide a summary of any monitoring (fence line outward completed in 2021.	No monitoring or assessment required or carried out in 2021.
Note, you are not required to conduct any off- site monitoring.	
Disclose any improvements/corrective actions implemented in 2021 or status thereof that would impact the noise level output for your site (either up or down).	None to disclose at this time.
Did those changes result in a requirement to update your site noise model?	
If so, have you provided your updated site model to SLR Consulting for incorporation into the NCIA Regional Noise Model as per the process outlined for this purpose?	

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Disclose any improvements/projects that are approved for 2022 that would impact the noise level output for your site (either up or down).	None to disclose at this time.
Will these changes result in a requirement to	
update your site noise model?	
If so, when do you anticipate having an	
updated site model available?	
Disclose any audit/self-assessment evaluation	2016 assessment and evaluation conducted by
(qualitative evaluation only, with senior site	Evonik ESHQ/OH experts. Suitable report
leader sign-off) completed for your site noise	excerpt available upon request.
management plan in 2021.	
Provide a Noise Complaint summary for all	No complaints.
noise complaints received in 2021 including	
any actions taken to address them.	

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## IPL HPC:

Note, please provide as much detail as you can for the following, attaching any clarifying or required documents with your submission. This is for the calendar year 2021.

Input Description	Member Site Comments		
Confirmation that site has implemented a best management practice to address environmental noise as per NCIA Noise Management Plan Standard 2010-003 issued 3-Sep-10, revised 5- Mar-13, revised 14-Apr-14, revised 31-Mar-16 including the Procedure/Practice/Standard reference.	Noise Management Plan (by SLR) in place and implementation in progress.		
Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.			
Provide a summary of any monitoring (fence line outward completed in 2021.	Facility still under construction and partial commissioning. Fence Line noise measurement scheduled for mid-2023 when the facility is		
site monitoring.	expected to reach steady state operation.		
Disclose any improvements/corrective actions implemented in 2021 or status thereof that would impact the noise level output for your site (either up or down).	N/A		
Did those changes result in a requirement to update your site noise model?			
If so, have you provided your updated site model to SLR Consulting for incorporation into the NCIA Regional Noise Model as per the process outlined for this purpose?			
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Disclose any improvements/projects that are approved for 2022 that would impact the noise level output for your site (either up or down).	N/A
Will these changes result in a requirement to update your site noise model?	
If so, when do you anticipate having an updated site model available?	
Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan in 2021.	N/A
Provide a Noise Complaint summary for all noise complaints received in 2021 including any actions taken to address them.	No noise complaints received in 2021 or throughout construction that started in 2017.

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### Keyera Fort Saskatchewan Fractionation Facility

Note, please provide as much detail as you can for the following, attaching any clarifying or required documents with your submission. <u>This is for the calendar year 2021.</u>

Input Description	Member Site Comments
Confirmation that site has implemented a best management practice to address environmental noise as per NCIA Noise Management Plan Standard 2010-003 issued 3-Sep-10, revised 5- Mar-13, revised 14-Apr-14, revised 31-Mar-16 including the Procedure/Practice/Standard reference.	Keyera has implemented a best management practice to address environmental noise as per standard 2010-003. Keyera updated the Noise Management Plan in 2020 and has previously provided an electronic copy of the site plan to NCIA.
Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.	
Provide a summary of any monitoring (fence line outward completed in 2021.	No monitoring was completed outside the fence line 2021
Note, you are not required to conduct any off- site monitoring.	
Disclose any improvements/corrective actions implemented in 2021 or status thereof that would impact the noise level output for your site (either up or down).	No corrective actions or changes occurred in 2021 that would change the results of the most recent noise model.
Did those changes result in a requirement to update your site noise model?	
If so, have you provided your updated site model to SLR Consulting for incorporation into the NCIA Regional Noise Model as per the process outlined for this purpose?	

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Disclose any improvements/projects that are approved for 2022 that would impact the noise level output for your site (either up or down).	No approved improvements or projects are currently sanctioned for 2022 that will impact site noise models.
Will these changes result in a requirement to update your site noise model?	
If so, when do you anticipate having an updated site model available?	
Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan in 2021.	None completed in 2021.
Provide a Noise Complaint summary for all noise complaints received in 2021 including any actions taken to address them.	There were no noise complaints received in 2021.

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# Linde Canada Inc.

Note, please provide as much detail as you can for the following, attaching any clarifying or required documents with your submission. <u>This is for the calendar year 2021.</u>

Input Description	Member Site Comments
Confirmation that site has implemented a best	Linde's NCIA facilities implement best
management practice to address environmental	management practices to address
noise as per NCIA Noise Management Plan	environmental noise.
Standard 2010-003 issued 3-Sep-10, revised 5-	
Mar-13, revised 14-Apr-14, revised 31-Mar-16	
including the Procedure/Practice/Standard	
reference.	
Note, if you have not provided an electronic	
copy of your site plan to NCIA, please do so.	NT
Provide a summary of any monitoring (fence	Not required.
line outward completed in 2021.	
Note you are not required to conduct any off	
site monitoring	
Disclose any improvements/corrective actions	Not applicable
implemented in 2021 or status thereof that	Not applicable.
would impact the noise level output for your	
site (either up or down)	
site (officer up of down).	
Did those changes result in a requirement to	
update your site noise model?	
If so, have you provided your updated site	
model to SLR Consulting for incorporation into	
the NCIA Regional Noise Model as per the	
process outlined for this purpose?	

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Disclose any improvements/projects that are approved for 2022 that would impact the noise level output for your site (either up or down). Will these changes result in a requirement to update your site noise model? If so, when do you anticipate having an updated site model available?	None.
Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan in 2021.	None.
Provide a Noise Complaint summary for all noise complaints received in 2021 including any actions taken to address them.	None.

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## North West Redwater Patnership Sturgeon Refinery:

Note, please provide as much detail as you can for the following, attaching any clarifying or required documents with your submission. <u>This is for the calendar year 2021.</u>

Input Description	Member Site Comments
Confirmation that site has implemented a best management practice to address environmental noise as per NCIA Noise Management Plan Standard 2010-003 issued 3-Sep-10, revised 5- Mar-13, revised 14-Apr-14, revised 31-Mar-16 including the Procedure/Practice/Standard reference.	Environmental Noise abatement was included in the design and initial build specifications for the NWR Refinery. A noise mpa/survey is being completed in 2022. Delayed due to non-design operational conditions prior to May 2021.
Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.	
Provide a summary of any monitoring (fence line outward completed in 2021. Note, you are not required to conduct any off-	None completed
Disclose any improvements/corrective actions implemented in 2021 or status thereof that would impact the noise level output for your site (either up or down). Did those changes result in a requirement to update your site noise model?	No noise improvement projects completed in 2021
If so, have you provided your updated site model to SLR Consulting for incorporation into the NCIA Regional Noise Model as per the process outlined for this purpose?	

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Disclose any improvements/projects that are approved for 2022 that would impact the noise level output for your site (either up or down). Will these changes result in a requirement to update your site noise model?	<ul><li>Failed silencer (Unit 40 gasifier) to be replaced during 2022 fall turnaround.</li><li>Site noise model will incorporate this change.</li></ul>
If so, when do you anticipate having an updated site model available? Disclose any audit/self-assessment evaluation	None completed in 2021
(qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan in 2021.	
Provide a Noise Complaint summary for all noise complaints received in 2021 including any actions taken to address them.	Noise complaints related to bird cannon discharge. Issue was related to another facility, but complaint was registered with our facility as well to cover all bases.

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## Nutrien Fort Saskatchewan

Note, please provide as much detail as you can for the following, attaching any clarifying or required documents with your submission. <u>This is for the calendar year 2021.</u>

Input Description	Member Site Comments
Confirmation that site has implemented a best management practice to address environmental noise as per NCIA Noise Management Plan Standard 2010-003 issued 3-Sep-10, revised 5- Mar-13, revised 14-Apr-14, revised 31-Mar-16 including the Procedure/Practice/Standard reference. Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.	<ul> <li>Nutrien has a Noise Management Plan. The plan consists of the following documents:</li> <li>ESP 3.07.01 Noise Management Overview</li> <li>ESP 3.07.02 Noise Management Program</li> <li>ESP 3.07.03 Noise Source List</li> <li>ESP 3.07.04 Monitoring Program</li> </ul>
Provide a summary of any monitoring (fence	There was no offsite monitoring completed in
line outward completed in 2021.	2021 for the Fort Saskatchewan facility.
Note, you are not required to conduct any off- site monitoring.	
Disclose any improvements/corrective actions	There were no improvements or corrective
would impact the noise level output for your site (either up or down).	Saskatchewan facility
Did those changes result in a requirement to update your site noise model?	
If so, have you provided your updated site	
model to SLR Consulting for incorporation into the NCIA Regional Noise Model as per the	
process outlined for this purpose?	

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Diselans any improvements/ansis statlest and	No improvement anniots are alarmed for 2022
Disclose any improvements/projects that are	No improvement projects are planned for 2022.
approved for 2022 that would impact the noise	
level output for your site (either up or down).	
Will these changes result in a requirement to	
update your site noise model?	
If so, when do you anticipate having an updated site model available?	
Disclose any audit/self-assessment evaluation	The Noise Management Plan, program and
(qualitative evaluation only with senior site	associated documents were not reviewed in
leader sign-off) completed for your site noise	2021
management plan in 2021.	2021
Provide a Noise Complaint summary for all	We received a neighbor complaint on 30-JUNE-
noise complaints received in 2021 including	2021. The resident called Sherritt security, reporting
any actions taken to address them	a noise that sounded like "equipment running" in
	the evening(s).
	Over the next several weeks, Sherritt and Nutrien
	both completed independent noise monitoring –
	both days and nights - using "grab sample"
	monitors. Readings from the grab samples showed
	<b>no indication of excess noise levels</b> . Grab samples
	also aligned with the NCIA noise modelling /
	mapping. On 19-JULY-2021 a meeting was held
	with Cory Wald (Nutrien), Greg Poholka (Sherritt)
	and Laurie Danielson (NCIA) and it was agreed that
	no further action was necessary, other than following up with the resident. Come apple with the
	ronowing up with the resident. Cory spoke with the
	findings (none) and desision
	maings (none) and decision.

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## Nutrien Redwater:

Note, please provide as much detail as you can for the following, attaching any clarifying or required documents with your submission. <u>This is for the calendar year 2021.</u>

Input Description	Member Site Comments
Confirmation that site has implemented a best management practice to address environmental noise as per NCIA Noise Management Plan Standard 2010-003 issued 3-Sep-10, revised 5- Mar-13, revised 14-Apr-14, revised 31-Mar-16 including the Procedure/Practice/Standard reference.	<ul> <li>Nutrien has a Noise Management Plan. The plan consists of the following documents:</li> <li>ESP 3.07.01 Noise Management Overview</li> <li>ESP 3.07.02 Noise Management Program</li> <li>ESP 3.07.03 Noise Source List</li> <li>ESP 3.07.04 Monitoring Program</li> </ul>
Note, if you have not provided an electronic	
Provide a summary of any monitoring (fence line outward completed in 2021. Note, you are not required to conduct any off- site monitoring.	There was no offsite monitoring completed in 2021 for the Redwater facility.
Disclose any improvements/corrective actions implemented in 2021 or status thereof that would impact the noise level output for your site (either up or down). Did those changes result in a requirement to update your site noise model? If so, have you provided your updated site model to SLR Consulting for incorporation into the NCIA Regional Noise Model as per the process outlined for this purpose?	Nitric Acid Process Unit – silencers were installed in summer 2021 on the compressor kickback line, as well as, the centrifugal air compressor discharge vent line (CVM exit vent line). Noise level may be slightly reduced. Ammonia II Process Unit - compressor / gas turbine (CGT-902) was replaced in summer 2021. The noise level should be relatively similar. Redwater facility will be updating the site noise model in 2022.

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Disclose any improvements/projects that are	Redwater
approved for 2022 that would impact the noise	No improvement/projects planned for 2022.
level output for your site (either up or down).	
Will these changes result in a requirement to	
update your site noise model?	
If so, when do you anticipate having an	
updated site model available?	
Disclose any audit/self-assessment evaluation	The Noise Management Plan, program and
(qualitative evaluation only, with senior site	associated documents were not reviewed in
leader sign-off) completed for your site noise	2021.
management plan in 2021.	
Provide a Noise Complaint summary for all	There was no external noise complaints for the
noise complaints received in 2021 including	Redwater facility in 2021.
any actions taken to address them.	

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# Oerlikon Metco (Canada) Inc. :

Note, please provide as much detail as you can for the following, attaching any clarifying or required documents with your submission. <u>This is for the calendar year 2021.</u>

Input Description	Member Site Comments
Confirmation that site has implemented a best	Yes
management practice to address environmental	
noise as per NCIA Noise Management Plan	
Standard 2010-003 issued 3-Sep-10, revised 5-	
Mar-13, revised 14-Apr-14, revised 31-Mar-16	
including the Procedure/Practice/Standard	
reference.	
Note: form have not more its too shot on its	
Note, if you have not provided an electronic	
copy of your site plan to NCIA, please do so.	No monitoring conducted
line outward completed in 2021	No monitoring conducted
The outward completed in 2021.	
Note you are not required to conduct any off-	
site monitoring	
Disclose any improvements/corrective actions	
implemented in 2021 or status thereof that	Sound curtains on screening tower
would impact the noise level output for your	8
site (either up or down).	
Did those changes result in a requirement to	No
update your site noise model?	
If so, have you provided your updated site	N/R
model to SLR Consulting for incorporation into	
the NCIA Regional Noise Model as per the	
process outlined for this purpose?	

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Disclose any improvements/projects that are approved for 2022 that would impact the noise level output for your site (either up or down).	None at this time
Will these changes result in a requirement to update your site noise model?	N/A
If so, when do you anticipate having an updated site model available?	N/A
Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan in 2021.	No audits completed
Provide a Noise Complaint summary for all noise complaints received in 2021 including any actions taken to address them.	No noise complaints received in 2021

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## Pembina NGL Corporation – Redwater Facilities:

Note, please provide as much detail as you can for the following, attaching any clarifying or required documents with your submission. <u>This is for the calendar year 2021.</u>

Input Description	Member Site Comments
Confirmation that site has implemented a best	Pembina Redwater facilities have a Noise
management practice to address environmental	Management Program, which includes
noise as per NCIA Noise Management Plan	implementation of Best Management Practices
Standard 2010-003 issued 3-Sep-10, revised 5-	to address environmental noise as per the
Mar-13, revised 14-Apr-14, revised 31-Mar-16	NCIA Noise Management Plan.
including the Procedure/Practice/Standard	
reference.	
Note, if you have not provided an electronic	
copy of your site plan to NCIA, please do so.	NT- france line contactor days with since and here to the
Provide a summary of any monitoring (fence	No fence line outward monitoring conducted in
The outward completed in 2021.	2021.
Note you are not required to conduct any off	
site monitoring	
Disclose any improvements/corrective actions	No changes made in 2021 Final
implemented in 2021 or status thereof that	measurements required in RFS II/III to finalize
would impact the noise level output for your	model from theoretical to actual Work was
site (either up or down)	postponed in 2021 due to Covid-19 site
	restrictionswork will be completed in 2021.
Did those changes result in a requirement to	
update your site noise model?	
If so, have you provided your updated site	
model to SLR Consulting for incorporation into	
the NCIA Regional Noise Model as per the	
process outlined for this purpose?	

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Disclose any improvements/projects that are approved for 2022 that would impact the noise level output for your site (either up or down). Will these changes result in a requirement to update your site noise model? If so, when do you anticipate having an	Actual measurements in the RFS II/III facilities will be completed in 2022 to finalize the site noise model. This will require an update to the RNM, which will be updated during the next NCIA update.
updated site model available? Disclose any audit/self-assessment evaluation	None completed
(qualitative evaluation only, with senior site	
leader sign-off) completed for your site noise	
management plan in 2021.	
Provide a Noise Complaint summary for all	No complaints received
noise complaints received in 2021 including	
any actions taken to address them.	

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# Plains Midstream Canada:

Note, please provide as much detail as you can for the following, attaching any clarifying or required documents with your submission.

Input Description	Member Site Comments
Confirmation that site has implemented a best	The Facility has an Environmental Noise
management practice to address environmental	Management Practice. The practice is part of
noise as per NCIA Noise Management Plan	PMC's Operational Management System
Standard 2010-003 issued 3-Sep-10, revised 5-	(FSK-P-36-00-12).
Mar-13, revised 14-Apr-14, revised 31-Mar-16	
including the Procedure/Practice/Standard	
reference.	
Note, if you have not provided an electronic	
copy of your site plan to NCIA, please do so.	
Provide a summary of any monitoring (fence	No monitoring/assessments were completed in
line outward completed in 2021.	2021.
Note, you are not required to conduct any off-	
site monitoring.	
Disclose any improvements/corrective actions	Construction activities commenced on the
implemented in 2021 or status thereof that	installation of new pumps to support cavern
would impact the noise level output for your	storage activities.
site (either up or down).	
	Construction activities commenced on the
	remediation of infrastructure affected by the
	emergency event on September 21, 2022.
Did those changes result in a requirement to	The new pumps have not commenced
update your site noise model?	operation in 2021. The new pumps may result
	in changes that require the facility to update the
	Regional Noise Model.
If so, have you provided your updated site	An update, if required, will be conducted in
model to SLR Consulting for incorporation into	conjunction with the next regional noise model
the NCIA Regional Noise Model as per the	update.
process outlined for this purpose?	

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Disclose any improvements/projects that are approved for 2022 that would impact the noise level output for your site (either up or down).	The continued installation of new pumps to support cavern storage activities.
Will these changes result in a requirement to update your site noise model?	These activities may result in changes that require the facility to update the Regional Noise Model. This will be evaluated as we proceed with expansion activities.
If so, when do you anticipate having an updated site model available?	An update, if required, will be conducted in conjunction with the next regional noise model update.
Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan in 2021.	No audits or self-assessment evaluations were completed in 2021.
Provide a Noise Complaint summary for all noise complaints received in 2021 including any actions taken to address them.	No noise complaints were received by the Facility in 2021.

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## Shell Scotford Facility:

Note, please provide as much detail as you can for the following, attaching any clarifying or required documents with your submission. <u>This is for the calendar year 2021.</u>

Input Description	Member Site Comments
Confirmation that site has implemented a best management practice to address environmental noise as per NCIA Noise Management Plan Standard 2010-003 issued 3-Sep-10, revised 5- Mar-13, revised 14-Apr-14, revised 31-Mar-16 including the Procedure/Practice/Standard reference.	Shell Scotford Facility has implemented a Noise Management Plan.
Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.	
Provide a summary of any monitoring (fence line outward completed in 2021.	No external noise monitoring in 2021
Note, you are not required to conduct any off- site monitoring.	
Disclose any improvements/corrective actions implemented in 2021 or status thereof that would impact the noise level output for your site (either up or down).	Turnaround activities occurred onsite in 2021 however no changes to site noise model required.
Did those changes result in a requirement to update your site noise model?	
If so, have you provided your updated site model to SLR Consulting for incorporation into the NCIA Regional Noise Model as per the process outlined for this purpose?	

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Disclose any improvements/projects that are approved for 2022 that would impact the noise level output for your site (either up or down).	None planned that would impact noise level. No update to model required.
Will these changes result in a requirement to update your site noise model?	
If so, when do you anticipate having an updated site model available?	
Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan in 2021.	N/A
Provide a Noise Complaint summary for all noise complaints received in 2021 including any actions taken to address them.	No noise complaints in 2021

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## **Sherritt International Corporation:**

Note, please provide as much detail as you can for the following, attaching any clarifying or required documents with your submission. <u>This is for the calendar year 2021.</u>

Input Description	Member Site Comments
Confirmation that site has implemented a best	The Site has implemented the referenced
management practice to address environmental	standard and developed a Code of Practice
noise as per NCIA Noise Management Plan	(FSSMP001-021) which has been previously
Standard 2010-003 issued 3-Sep-10, revised 5-	submitted to NCIA.
Mar-13, revised 14-Apr-14, revised 31-Mar-16	
including the Procedure/Practice/Standard	There were no updates made to the Code of
reference.	Practice in 2021.
Note, if you have not provided an electronic	
copy of your site plan to NCIA, please do so.	
Provide a summary of any monitoring (fence	None
line outward completed in 2021.	
Note, you are not required to conduct any off-	
site monitoring.	
Disclose any improvements/corrective actions	
implemented in 2021 or status thereof that	
would impact the noise level output for your	
site (either up or down).	
Did those changes result in a requirement to	None in 2021.
update your site noise model?	
	The Site noise model does not require updating
It so, have you provided your updated site	at this time.
model to SLR Consulting for incorporation into	
the NCIA Regional Noise Model as per the	
process outlined for this purpose?	

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Disclose any improvements/projects that are approved for 2022 that would impact the noise level output for your site (either up or down). Will these changes result in a requirement to update your site noise model? If so, when do you anticipate having an	None in 2022. The Site noise model does not require updating at this time
Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan in 2021.	None
	Sherritt received a noise complaint from a resident of Fort Saskatchewan on June 29, 2021. The resident advised that a "steady roar" could be heard some nights between 10pm and 5am, when outside temperatures are warm. The noise was not heard every night and was not heard during the day or through the winter months.
Provide a Noise Complaint summary for all noise complaints received in 2021 including any actions taken to address them.	Actions taken: Call out to Site units and Oerlikon, Umicore and Nutrien. Nutrien sent personnel out to investigate and collect measurement readings. The investigation did not reveal any abnormal or elevated measurements when compared with historical sound modelling. The complaint was closed after the investigation was completed with no additional follow up requirements. The NCIA and AEP were advised of the incident at the time of occurrence.

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## Umicore Canada Inc.

Note, please provide as much detail as you can for the following, attaching any clarifying or required documents with your submission. <u>This is for the calendar year 2021.</u>

Input Description	Member Site Comments
Confirmation that site has implemented a best	Code of Practice (COP-323-7) Noise Exposure
management practice to address environmental	Management Plan included in the Umicore
noise as per NCIA Noise Management Plan	Canada Inc. Management System.
Standard 2010-003 issued 3-Sep-10, revised 5-	
Mar-13, revised 14-Apr-14, revised 31-Mar-16	Reference to 'environmental noise' included in
including the Procedure/Practice/Standard	the Umicore Canada Inc. Air Quality
reference.	Management Program (COP-319-2)
Note, if you have not provided an electronic	
copy of your site plan to NCIA, please do so.	
Provide a summary of any monitoring (fence	Not applicable – noise monitoring conducted
line outward completed in 2021.	inside the plant from an industrial hygiene
	perspective
Note, you are not required to conduct any off-	
site monitoring.	
Disclose any improvements/corrective actions	Management of Change (MOC) program
implemented in 2021 or status thereof that	includes elements to identify potential changes/
would impact the noise level output for your	impacts with respect to noise exposure.
site (either up or down).	
	There were no projects in 2021 that impacted
Did those changes result in a requirement to	noise exposures up or down.
update your site noise model?	
If so, have you provided your updated site	
model to SLR Consulting for incorporation into	
the NCIA Regional Noise Model as per the	
process outlined for this purpose?	

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Disclose any improvements/projects that are approved for 2022 that would impact the noise level output for your site (either up or down). Will these changes result in a requirement to	Many of the projects approved for 2022 will not have any effect on the noise level. All circuits for the most part are located inside of Umicore proper buildings and maintain a rating of approximately 81 - 83 db.
update your site noise model?	
	No requirement to update site noise model.
If so, when do you anticipate having an	
updated site model available?	
Disclose any audit/self-assessment evaluation	Not applicable – noise monitoring conducted
(qualitative evaluation only, with senior site	inside the plant from an industrial hygiene
leader sign-off) completed for your site noise	perspective
management plan in 2021.	
Provide a Noise Complaint summary for all	No complaints received in 2021.
noise complaints received in 2021 including	_
any actions taken to address them.	

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### Access Pipeline o/a Wolf Midstream (Stonefell Terminal – Operating on Behalf of MEG Energy)

Note, please provide as much detail as you can for the following, attaching any clarifying or required documents with your submission. This is for the calendar year 2021.

Input Description	Member Site Comments
Confirmation that site has implemented a best management practice to address environmental noise as per NCIA Noise Management Plan Standard 2010-003 issued 3-Sep-10, revised 5- Mar-13, revised 14-Apr-14, revised 31-Mar-16 including the Procedure/Practice/Standard reference.	Access abides by AER's Directive 38. We participate in industrial noise monitoring.
Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.	
Provide a summary of any monitoring (fence line outward completed in 2021.	A noise monitoring was not conducted in 2021.
Note, you are not required to conduct any off- site monitoring.	
Disclose any improvements/corrective actions implemented in 2021 or status thereof that would impact the noise level output for your site (either up or down). Did those changes result in a requirement to update your site noise model?	N/A
If so, have you provided your updated site model to SLR Consulting for incorporation into the NCIA Regional Noise Model as per the process outlined for this purpose?	

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Disclose any improvements/projects that are approved for 2022 that would impact the noise level output for your site (either up or down).	There were no anticipated projects or improvement for 2021 that may have impacted noise levels.
Will these changes result in a requirement to update your site noise model?	
If so, when do you anticipate having an updated site model available?	
Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan in 2021.	None.
Provide a Noise Complaint summary for all noise complaints received in 2021 including any actions taken to address them.	We did not receive any noise complaints for the 2021 year.

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## Access Pipeline o/a Wolf Midstream (Sturgeon Terminal)

Note, please provide as much detail as you can for the following, attaching any clarifying or required documents with your submission. <u>This is for the calendar year 2021.</u>

Input Description	Member Site Comments
Confirmation that site has implemented a best management practice to address environmental noise as per NCIA Noise Management Plan Standard 2010-003 issued 3-Sep-10, revised 5- Mar-13, revised 14-Apr-14, revised 31-Mar-16 including the Procedure/Practice/Standard reference.	Access abides by AER's Directive 38. We participate in industrial noise monitoring.
Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.	
Provide a summary of any monitoring (fence line outward completed in 2021.	A noise monitoring was not conducted in 2021.
Note, you are not required to conduct any off- site monitoring.	
Disclose any improvements/corrective actions implemented in 2021 or status thereof that would impact the noise level output for your site (either up or down).	N/A
Did those changes result in a requirement to update your site noise model?	
If so, have you provided your updated site model to SLR Consulting for incorporation into the NCIA Regional Noise Model as per the process outlined for this purpose?	

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Disclose any improvements/projects that are	There were no anticipated projects or
approved for 2022 that would impact the noise	improvement for 2021 that may have impacted
level output for your site (either up or down).	noise levels.
Will these changes result in a requirement to	
undata your sita noisa modal?	
update your site noise model?	
If so, when do you anticipate having an	
updated site model available?	
Disclose any audit/self-assessment evaluation	None.
(qualitative evaluation only, with senior site	
leader sign-off) completed for your site noise	
management plan in 2021.	
Provide a Noise Complaint summary for all	We did not receive any noise complaints for
noise complaints received in 2021 including	the 2021 year.
any actions taken to address them.	